EXHIBIT 28

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

SONOS, INC., Plaintiff,	Civil Action No. 6:20-cv-00881-ADA
vs.	
GOOGLE, LLC, Defendant.	

VIDEOCONFERENCE DEPOSITION OF CHRISTOS KYRIAKAKIS

Friday, June 11, 2021

Volume I

Reported by:
KATHLEEN E. BARNEY
CSR No. 5698
Job No. 4626386
PAGES 1 - 202

IN THE UNITED STATES DISTRICT COURT
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WACO DIVISION

SONOS, INC., Plaintiff, vs. GOOGLE, LLC, Defendant.

Civil Action No. 6:20-cv-00881-ADA

Videoconference deposition of CHRISTOS KYRIAKAKIS, Volume I, taken on behalf of Plaintiff, beginning at 9:02 a.m. and ending at 3:10 p.m. on Friday, June 11, 2021, before KATHLEEN E. BARNEY, Certified Shorthand Reporter No. 5698.

APPEARANCES:

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INDEX

EXHIBITS

Page 6

Friday, June 11, 2021

9:02 a.m.

THE VIDEOGRAPHER: Good morning. We are on the record at 9:02 a.m. on June 11, 2021. 09:02:30

All participants are appearing remotely. Audio and video recording will continue to take place unless all parties agree to go off the record.

This is Media Unit 1 of the recorded deposition of Christos Kyriakakis taken by counsel 09:02:49 for the plaintiff in the matter of Sonos, Inc., versus Google, LLC, filed in the U.S. District Court, Western District of Texas, Waco Division, case number 6:20-CV-00881-ADA.

My name is Kimberlee Decker from Veritext 09:03:12 Legal Solutions. I'm the videographer. The court reporter is Kathy Barney. I'm not related to any party in this action, nor am I financially interested in the outcome.

Counsel and all present will now state their 09:03:26 appearances and affiliations for the record. If there are any objections to proceeding, please state them at the time of your appearance, beginning with the noticing attorney.

MR. PAK: This is Jae Pak, counsel for Sonos, 09:03:33

Page 7

from Lee Sullivan Shea & Smith.

MR. KAPLAN: This is Marc Kaplan from Quinn Emanuel Urquhart & Sullivan for Google and the witness.

MR. LEE: Good morning. This is George Lee 09:03:52 for plaintiff Sonos. I'm also with the firm of Lee Sullivan Shea & Smith in Chicago.

THE VIDEOGRAPHER: Thank you. Will the court reporter please swear in the witness.

CHRISTOS KYRIAKAKIS,

having been administered an oath, was examined and testified as follows:

EXAMINATION

BY MR. PAK:

Q Dr. Kyriakakis, could you please state and spell your name for the record.

A Sure. First name is -- legal first name is Christos, but I go by Chris, last name is 09:04:34 K-Y-R-I-A-K-A-K-I-S.

Q Is it okay if I call you Dr. K throughout this deposition?

A Yes, please do.

Q Have you been deposed before? 09:04:48

Page 8

A I have.

Q How many times have you been deposed? Just a ballpark is fine.

A Two other times.

Q How many times have you been deposed as an 09:04:57 expert witness? Were you an expert witness in both of those cases?

A Yes, I was.

Q And these are patent cases, correct?

A Correct. 09:05:16

Q When was the last time you were deposed?

A It was -- I think it was 2018. I don't have the exact date, but I think it was 2018.

Q Sure. Do you remember what case that was?

A It was -- so it was two in that same year. 09:05:34 So one of them was -- I was working on behalf of Apple, which was an ITC case. Actually, initially the case involved Apple and Samsung as co-defendants. So that was one case. And the other case was for Apple, a separate case. 09:06:05

Q Okay. And so we're on the same page, I want to run through some general guidelines. So just bear with me here.

I'll ask you questions and you must give truthful answers. Your counsel may object to 09:06:20

Page 9

questions, but unless your counsel instructs you not to answer, you still must answer despite the objection.
Do you understand?
A I do. 09:06:30
Q And if you don't understand a question or need clarification, please ask. Otherwise I'll assume that you understand the question.
We'll plan to take a break every hour or so. If you need a break outside of that schedule, just 09:06:38 let me know and I'll accommodate the request. The only thing I ask is, you know, to finish any pending question before we go on break.
And the court reporter will be transcribing our discussion today, so I need you to give verbal 09:06:50 answers as opposed to head nods or the like.
Understood?
A Yes.
Q Okay. I'll slow down here now.
When did you begin working on this case 09:07:02 between Sonos and Google?
A Oh, I don't know the exact date. It was a few months ago.
Q Okay. So it was sometime this year?
A Yes. 09:07:16

Q Did you sign an engagement letter?
A I did.
Q And when did you sign the engagement letter, do you remember?
A Shortly after I talked to the attorneys and I 09:07:29 was told they wanted to retain me. I don't have the exact date. I think it was a few months ago.
Q Few months as in maybe April of this year or sometime before?
A I'm pretty sure it was before. 09:07:45
Q Okay.
A I don't have the exact date.
Q No, I understand.
Who is that engagement between? Is that between you and Google or Google's counsel or 09:07:57 someone else?
A It is -- I believe it's between me and Google's counsel.
Q And Google's counsel being Quinn Emanuel; is that correct?
A Correct.
Q Have you worked with Quinn Emanuel before?
A I have.
Q How many times have you worked with Quinn Emanuel? 09:08:18

A Probably two other times. It was different attorneys. Different matters.
Q What was the nature of your engagement with Quinn Emanuel?
MR. KAPLAN: Object to form. 09:08:33
THE WITNESS: It was similar. They were patent cases and I was an expert witness for their client.
BY MR. PAK:
Q Do you recall what cases? 09:08:43
A I believe one was Blitzsafe versus Daimler Benz, Mercedes. And the other one escapes me because I remember the cases, but not necessarily all the affiliations.
THE VIDEOGRAPHER: You're speaking a little 09:09:26 low.
THE WITNESS: Interesting. Okay. Is that better?
BY MR. PAK:
Q Have you provided expert opinions on behalf 09:09:44 of Google before?
A I have not.
Q Have you offered opinions with respect to any Google products?
A No. 09:09:55

Q Have you offered opinions with respect to any mobile apps that can be installed on your phone or tablet?
A No.
Q Have you used any Google audio products 09:10:07 before?
A I have -- yes, I have used them. I don't own them, but I have used them.
Q What products have you used?
A It was a Google speaker. 09:10:22
Q Do you know what speaker it was?
A I think it's called Google Home.
Q Did you use any specific feature of Google Home?
A I was interested in evaluating the voice 09:10:45 performance, the voice recognition performance, especially how it performs in noisy environments.
Q So you've experimented with Google Assistant; is that correct?
MR. KAPLAN: Object to form. 09:11:12
THE WITNESS: In the context of that product, yes.
BY MR. PAK:
Q Okay. Have you used the Google Home app before? 09:11:24

A No.
Q So how did you set up the Google Home product?
A That's a good question. It's been a while. Okay. I guess I used it to set it up. I thought you were asking if I used it to interact with it. 09:11:40
Q Okay. Have you used any Google Pixel device before?
A No. 09:11:53
Q Have you used any Sonos products?
A Yes.
Q What Sonos products have you used before?
A Sonos Play:1. And Sonos Subwoofer.
Q Have you used any other Sonos products before? 09:12:17
A No.
Q Do you own a Sonos Play:1 or Sonos Sub?
A Yes, I do.
Q When did you first purchase the Play:1 and the Sonos Sub? 09:12:33
A Two years ago approximately.
Q Why did you purchase the Play:1 and Sonos Sub?
A As part of my work and research, I have, I 09:12:59

would say, an unusually large collection of speaker products and I've purchased them to evaluate their acoustic performance, compare them to others, and so on.
Q Do you own more than one Play:1 and more than one Sonos Sub? 09:13:16
A I have three Play:1s and one Sonos Sub.
Q Have you ever stereo-paired two Play:1s together?
A Yes. Yes, I have. 09:13:47
Q And have you compared that to other -- when you say others, you're talking about other audio products?
A I guess what do you mean by "compared"?
Q Yeah. So you said you evaluated the acoustic performance of the Sonos Play:1 products with others, right? 09:14:09
A Yes.
Q And who are these others that you're referring to here? 09:14:23
MR. KAPLAN: Object to form.
THE WITNESS: There's a number of them. Some are home speakers. PSB. Bose. Amazon products. Paradigm is a high-end company that makes wireless speakers. A number of others. 09:14:51

I mean, that's kind of what I do on a regular basis just to understand what is going on and who is doing what acoustically in rooms.
BY MR. PAK:
Q So have you evaluated these products for other reasons? Other than acoustic performance, have you evaluated these products for some other reason? 09:15:04
A No.
Q And just for curiosity, I guess, which product has the best acoustic performance, in your opinion? 09:15:15
A I'm going to get in big trouble. I'm not going to answer that. A lot of them it's an objective measurement, but a lot of it is very subjective. So I'm probably going to stay away from that one. 09:15:35
Q That's fair.
I want to talk about your professional experience. Do you have any computer programming experience? 09:15:46
A Yes.
Q Do you remember the last time you coded or programmed something?
A Two days ago. 09:15:59

Q Got it.
Have you taught any computer science courses before?
A No.
Q Have you taught any network courses before? 09:16:09
A Network specific, no.
I should mention I have computer science students in my courses, but they're not specific under the computer science department.
Q Got it. But you haven't taught any computer science courses. Did you say you haven't taught any network courses; is that correct? 09:16:24
A That's correct.
Q Do you have any networking experience?
A Yes. Quite a bit, especially with streaming media. My research group was one of the first to implement multichannel audio streaming across the country over Internet2, and for that we had a large group that was working on various aspects of networking, including peer to peer and other aspects of it. So, yeah, quite a bit of experience. 09:16:41 09:17:05
Q What is Internet2?
A Internet2 is what the internet was when it first started, which is a network that was closed off to the public and only open to academic and 09:17:24

research institutions. It's a much higher bandwidth network that is basically used for experimentation for next-generation applications on the internet.
Q So do you have any experience in designing or implementing a network? 09:17:48
A My experience is in coding, testing performance of networks, not necessarily designing networks from scratch. Software that goes on networks, though, yes.
Q But you never designed or architected a network, right? Is that right? 09:18:11
MR. KAPLAN: Object to form.
THE WITNESS: Well, I guess I'm -- architected -- I was part of the team. I led the team that architected a multichannel audio streaming solution, Lossless, over a network. And so I didn't build the network from scratch. It was an existing network. We just built the software to run all of that. 09:18:34
BY MR. PAK: 09:19:01
Q Got it.
And you're the founder and CTO of a company called Audyssey Laboratories; is that correct?
A That's right.
Q And I see the background. Is that an 09:19:07

Audyssey Laboratories product behind you?
A The loud speaker, no.
Q No?
A No, it's not. I have one, but it's not in this room. 09:19:21
Q What products did you help design at Audyssey?
A So Audyssey was a spinout from my research lab at USC with a couple of graduate students. We started in the audio technology licensing business, 09:19:36 and so the product there was technologies for automatic measuring of acoustical problems in rooms and solutions for fixing them. And perhaps you've seen the little microphone that comes with home theater equipment. You put it in your living room 09:20:01 or your car or IMAX theaters, for example. There are many places that have that.
So it started as a software solution that was being licensed. In the course of that company, we also designed some loudspeaker products to showcase 09:20:23 the technologies so that we could be fully in control of them.
And these were wireless speakers. Three were wireless and one was wired. And so those were -- those were the physical products that found 09:20:48

themselves inside the stores like the Apple Store and Best Buy.
Q Do you know any Audyssey -- do you know the product names of any of the Audyssey products?
A The loudspeakers? 09:21:02
Q Yes. Any Audyssey product, really.
A So the main Audyssey product was called MultEQ, M-U-L-T-E-Q. That was the name of the umbrella of technologies that had to do with acquiring in-room information, acoustical 09:21:21 information, and correcting it. And the logo is still found on many receivers like Marantz and Denon, D-E-N-O-N.
The speaker products had -- were named of after interesting, hip neighborhoods. That was the 09:21:51 marketing plan. So Lower East Side, Market -- South of Market. Yeah.
Q Are you familiar with the Audyssey Sub Equalizer product?
A I am, yes. 09:22:19
Q What is a sub equalizer?
A A sub equalizer -- so in the home theater market, it is popular to have separate components for audio systems. So people will buy their favorite loudspeakers, they will buy their favorite 09:22:39

audio receiver amplifier.
And for people that already had invested money in a product that didn't have Audyssey room correction in it, we actually made two products. One was called the Audyssey Equalizer, which allowed 09:22:51 you to insert it in the path, in the audio path, and take advantage of the Audyssey technologies.
And the sub equalizer was basically the same thing except it was only focused on room correction of the subwoofer frequency range, the low 09:23:15 frequencies.
Q Got it.
And I want to introduce an exhibit here. It's the Audyssey manual. And I just uploaded it in the exhibits folder and marked it as Exhibit 1. 09:23:28
(Exhibit 1 was marked for identification electronically and is attached hereto.)
BY MR. PAK:
Q Do you see that?
A Not yet. I'm refreshing the screen here. 09:23:34 I'm looking at another monitor, so --
Q Sure. I am too.
THE VIDEOGRAPHER: You have to refresh the browser each time.
MR. KAPLAN: Chris, sometimes you can just 09:24:02

hit the Marked Exhibits folder again and that will do it.
THE WITNESS: Oh, there it is. Okay. I got it. I'm opening it now.
BY MR. PAK: 09:24:17
Q Do you recognize this document?
A Sorry, it hasn't opened yet.
Q Sure. Let me know.
A Okay. Yes, it's open now.
Yes, I recognize it. 09:24:26
Q Okay. And this is the Audyssey MultEQ Pro User Guide, correct?
A Correct, MultEQ Pro. It was software that we provided to home theater installers. And this was additional functionality than what a consumer could 09:24:45 do with the built-in software. And we marketed it as MultEQ Pro.
Q I want to turn to PDF, page 14. And there's a connection diagram for the Audyssey Sub Equalizer.
Do you see that? 09:25:02
A It's coming. Page 14?
Q PDF page 14.
A Oh, PDF page 14.
Q But it's page 10 of the manual.
A Okay. 09:25:26

Q Okay. So you see the connection diagram for the Audyssey --
A Yes.
Q Does that look like an accurate representation of the Sub Equalizer? 09:25:33
MR. KAPLAN: Object to form.
THE WITNESS: It's an accurate representation of how we recommended the connection, yes.
BY MR. PAK:
Q Was the Sub Equalizer designed to communicate 09:25:48 over Wi-Fi?
A No.
Q Was the Sub Equalizer designed to communicate over Bluetooth?
A No. 09:25:58
Q Was the Sub Equalizer designed to communicate over Ethernet?
A No.
Q Was the Sub Equalizer designed to communicate over a data network? 09:26:09
A Well, it was designed to accept, process and produce or transmit audio data.
So in the context of data -- audio being data, which it is, I would say yes, it's connected to two devices as shown here and it's passing audio 09:26:30

data after processing it.
Q Well, let me ask you this. The Sub Equalizer was not designed to communicate over Wi-Fi, Bluetooth, or Ethernet. How did it communicate over a data network? 09:27:01
MR. KAPLAN: Object to form.
THE WITNESS: Well, those are not the only types of networks. Anything that carries data is a data network. So this is an audio data network.
BY MR. PAK: 09:27:11
Q You're saying these speakers -- how are these speakers connected to the Sub Equalizer?
A Through audio cables.
Q What kind of -- sorry, I didn't mean to cut you off. 09:27:27
A No, no. It's fine.
Q What audio cables do you use to connect, you know, one of these speakers to a Sub Equalizer?
A They're called line level cables or RCA because of the type of connector, which is named as 09:27:46 an RCA connector.
Q So if you have a speaker connected to, you know, another device, you know, another device here being a Sub Equalizer via RCA cables, are they communicating over a data network? 09:28:06

A In the most general definition of a data network, audio certainly falls into that. And I would consider this a wired data network. To put it in the context of the discussion we're having today, yes. 09:28:27
Q Okay. So, I mean, any device that can carry data to another device is a data network; is that correct?
MR. KAPLAN: Object to form.
THE WITNESS: Any infrastructure that can 09:28:37 connect devices and carry data, yes.
BY MR. PAK:
Q In general, do you have an understanding of what a term of art is?
A Yes. 09:28:53
MR. KAPLAN: Object to form.
BY MR. PAK:
Q What is your understanding?
A A term of art in my understanding is -- maybe not the exact legal definition -- it's what a person 09:29:05 of skill would understand that to mean in the art, in the field.
Q Is the term "network" a term of art?
MR. KAPLAN: Object to form.
THE WITNESS: Yes. 09:29:25

BY MR. PAK:
Q Before you were engaged as an expert for this matter, did you have an understanding of what network means?
A Yes. 09:29:34
Q What was that understanding?
A Basically what I said a minute ago. A network is an infrastructure of devices and interconnects that allows the flow of data between them. Or enables the flow of data between them. 09:29:54
Q Okay. So your definition of a network is the same as a data network; is that correct?
MR. KAPLAN: Object to form.
THE WITNESS: I think -- a network carries data, so yes. 09:30:19
BY MR. PAK:
Q Is "data" a term of art?
A Yes, it is.
Q Before Google engaged you as an expert in this matter, did you have an understanding of what 09:30:41
data means?
A Yes, absolutely.
Q What was that understanding?
A Data is in its -- in the highest level definition, data is information. 09:30:53

Q Can data be analog or digital?
A Yes, absolutely.
Q Is "data network" a term of art?
A I would say yes.
Q Is there a difference between a network and a 09:31:18
data network?
MR. KAPLAN: Object to form.
THE WITNESS: In the context of what we're speaking of, I would say no. There is a network of people that I have on LinkedIn, but that's a 09:31:35
different kind of network. But in this context, I would say no.
BY MR. PAK:
Q Would you say that a network and a data network are both mediums that carry data? 09:31:54
MR. KAPLAN: Object to form.
THE WITNESS: In this context, yes.
BY MR. PAK:
Q Okay. What are the types of devices that can be on a data network? 09:32:15
MR. KAPLAN: Object to form.
THE WITNESS: The types? What do you mean by "types"?
BY MR. PAK:
Q Well, for example, you can have a laptop or 09:32:29

laptops on a data network, correct?
A Correct.
Q Are there any other types of devices other than a laptop that can be on a data network?
A Anything that allows the passage of data 09:32:45
through it that is connected to other devices can be on a data network.
So in a studio environment, microphones and loudspeakers are on a data network, and sometimes over very long distances. The control room is in 09:33:06
another place. Obviously computers are on a data network. Cell phones are on a data network. Yes. And many other types of devices.
Q Sure. And a data network can be wired or wireless, correct? 09:33:26
A Correct.
Q What are the types of cables or interfaces to transfer data over a wired data network?
MR. KAPLAN: Object to form.
THE WITNESS: Over wired? 09:33:39
BY MR. PAK:
Q Yes. I -- well, I assume in a wireless data network you wouldn't need cables, right?
A Right. Correct.
In a wired one, I mean, I guess anything that 09:33:51

can establish electrical connection. So it would be -- it could be copper, it could be optical, it could be Ethernet. There's probably others that I'm forgetting, but --
Q You mentioned earlier RCA cables, you can use 09:34:20
an RCA cable to --
A Yeah. Those fall into copper for me, but yes.
Q Got it. What about speaker wires, does that fall under copper? 09:34:33
A Also under copper.
Q Does a data network require devices to transfer data in a certain format to communicate with another device that is on the network?
A There has to be -- the devices have to 09:34:47
understand the data coming in. So if that is what you mean by format, then yes. If not, there are translator devices that can convert it.
Q Okay. So when a device transfers data to another device on a data network, there's got to be 09:35:14
some kind of protocol, right?
A Yes.
MR. KAPLAN: Object to form.
BY MR. PAK:
Q What are the protocols that are required for 09:35:25

a data network?
A There's a pretty large number of them. A common protocol is to -- is based on the principal of modulation. Again, I'm speaking in the context of our discussion today and the matters here. 09:35:45
So in a modulation concept, the modulation type protocol is understood to take in data, put it in a certain form so that the receiving device can understand it. Since we're speaking of audio, pulse code modulation is a common one. 09:36:14
There are optical protocols called SPDIF, Sony Phillips Digital Interchange Format. There are, of course, computer-to-computer protocols such as Ethernet. And several others.
Q Okay. Specifically if a device wants to communicate with another device on an internet-based network, what protocols are required for that communication? 09:36:49
MR. KAPLAN: Object to form.
THE WITNESS: Can you define internet-based network for me, please? 09:37:10
BY MR. PAK:
Q Yeah. So communicate over Wi-Fi or Ethernet, for example.
MR. KAPLAN: Object to form. 09:37:20

than 802.11?
A Well, there are other Wi-Fi methods that are proprietary to individual companies that may -- that don't have to comply with 802.11 between their own devices. I don't know how they work because they're proprietary, but they do exist. 09:39:45
Q And these protocols you mentioned, like 802.11, for example, or TCP, they require data to be sent in a certain format; is that correct?
MR. KAPLAN: Object to form. 09:40:02
THE WITNESS: Those protocols, the standards require, yes, data to be in a certain type. Just like all the other protocols.
BY MR. PAK:
Q Do the Wi-Fi and Ethernet standards require data to be sent in data packets? 09:40:17
A The 802.11 Wi-Fi does. The Ethernet, as I said, you can -- Ethernet is basically the cable. Different protocols can run on it. TCPIP is data packets, yes. Or it's based on data packets. 09:40:37
Q Are there any Wi-Fi Ethernet standards that don't require data to be sent in the form of data packets?
A As I said, I don't know the Wi-Fi inner workings of the proprietary ones, so I'm not sure I 09:40:58

THE WITNESS: Oh, I'm sorry. Did you say Ethernet or internet?
BY MR. PAK:
Q Wi-Fi or Ethernet.
A Ethernet. I see. 09:37:29
Q Yeah.
A So the format for those is -- I mean, there's a Wi-Fi standard under the 802.11 IEEE, Institute of Electrical and Electronics Engineers, and that standard has been established for -- the devices 09:37:52 that want to talk to each other on Wi-Fi have to implement that standard on the transmitter and the receiver so that they can communicate.
There are also standards for Ethernet. A common one is TCP, Transfer Control Protocol. There 09:38:10 are others.
Q Can you name some of the other protocols?
MR. KAPLAN: Object to form.
THE WITNESS: There are Asynchronous Transfer Mode, ATM. Token Ring kind of networks. And a 09:38:43 variation of that, which is a Star network.
That's what comes to mind now. I'm sure I can think of more later.
BY MR. PAK:
Q Are there any other Wi-Fi standards other 09:39:18

can answer that. Or the wired ones.
There are multi-room systems that have been around in the home installer market for a long time that use Ethernet. But it's not necessarily a standard Ethernet, based on a standard. So I 09:41:16 couldn't say for sure what they use.
Q Okay. And I want to introduce another exhibit here. Just give me one minute.
A Sure.
Q Okay. I just uploaded Exhibit 2. Let me 09:41:33 know if you see it.
A Yes. Okay.
(Exhibit 2 was marked for identification electronically and is attached hereto.)
BY MR. PAK: 09:41:57
Q Do you recognize this document?
A No.
Q Okay. Well, I'll represent to you that these are slides from a computer networks course from Cornell University that I downloaded from the 09:42:11 internet.
Do you see on the first page it says "CS519: Computer Networks," correct?
A I do.
Q And it's a lecture from January 24, 2004, 09:42:18

right?
A Yes.
Q Okay. And I want to focus on the slide 6, so PDF page 6.
A They're not numbered. What is the title of the slide? 09:42:35
Q It says, "What is a data network?"
A I see it.
MR. KAPLAN: Chris, I don't mean to interrupt, but if you sort of scroll your mouse over the exhibit, it will show the page numbers there. 09:42:48
THE WITNESS: Yeah, I just realized. But for some reason it's showing as page 5 for me. But, okay, I do see it.
BY MR. PAK: 09:43:00
Q I guess it is page 5. Page 5 of the PDF.
A Yes.
Q And it says:
"What is a data network?" And then, "The answer is not a network that carries data." 09:43:09
Do you see that?
A I do.
Q And the slide explains that one reason why a data network is not a network that carries data is 09:43:20

because you can send data over a voice network, which is often a euphemism for a circuit network, and a voice network is not a data network.
Do you see that?
A I do. 09:43:36
Q Do you agree with that statement?
A Not at all.
Q Why do you disagree?
A I think it's an appropriate statement for a packet network course -- for a network course, it's appropriate for that kind of class, but I don't think that's a general statement that is true because data -- networks carry data. That's the very definition of a network. 09:43:44
I don't know this class, but it sounds like they're going to be talking about a subset of networks that carry packet data, and they certainly exist. 09:44:09
Q Well, you say you never taught a course in computer networks; is that right? 09:44:22
A Yes.
Q Do you agree that a voice network is a euphemism for a circuit network?
A No. That is not a term of art.
Q Why do you disagree? 09:44:32

A First of all, I never heard that euphemism, and I'm pretty familiar with the field of streaming audio and networks and use for that, and voice. I think a voice network is a data network. It's carrying voice data. 09:44:59
Q Well, what is a voice network?
A It's a network that carries voice. For example, a telephony network.
Q Could you give me some other examples of a voice network? 09:45:23
A If we're talking about a network that only carries voice, then I think telephony is probably the only one that comes to mind. There are other networks that carry voice and other things, like cellular networks and cell phone networks. But if we're talking about just voice, then I would think telephony is the -- I -- I just thought of another one. A walkie-talkie network that has multiple wireless devices that a firefighter department would use, that is a voice network and it carries data. 09:45:42 09:46:01
Q So a walkie-talkie network, in your opinion, is a data network?
A Well, I guess walkie-talkie network is -- walkie-talkie is the devices on a wireless network that exchange voice data. 09:46:25

Q And what protocol does this wireless network use to exchange voice data?
A Most of them are based on radio frequency, RF. But the protocols, again, I think are proprietary to the individual companies that make them, like Motorola and others. 09:46:48
Q And when you say a telephony network, are you referring to a public switch telephone network?
A Yes.
Q Okay. So a public switch telephone network is a voice network; is that right? 09:47:05
A Yes.
Q Is a cellular network a voice network?
A Well, as I said before, it can be a voice network if all that anyone does on it is speak on the phone. But it is capable of other information as well on that network. So it's not exclusively voice. 09:47:23
Q So a cellular network can either transmit voice or data, right? 09:47:36
A No.
MR. KAPLAN: Object to form.
THE WITNESS: Voice -- a cellular network transmits or carries data. Voice is data as far as it's concerned. 09:47:53

BY MR. PAK:
Q Right. So a cellular network can carry data in the form of voice, right, or non-voice data; is that right?
A Right. 09:48:05
Q So how do you transmit voice data over a cellular network?
A Well, it depends on what kind of cellular network. There are different kinds of cellular networks. So the first ever created was probably, I 09:48:25 would say, in Japan in 1979 or 1980, somewhere there. And it was an analog-based system where -- and I guess at the time that would have been truly for voice because I don't think there was other multimedia data being sent over the network. 09:48:47
So that was through a mechanism called frequency division multiplexing, which basically is a protocol for splitting up the audio bandwidth into different bands and then dividing them into different bands, and then blending them all together 09:49:04 when they arrive at the other end. So that was a purely analog system. And, actually, it's still in existence in some parts of the world.
There are also digital systems, and they have increased over the years from -- starting from 2G, 09:49:23

which was the first one, all the way to what we have today, which is 5G, increasing the bandwidth of each connection and also total bandwidth to improve quality and speed.
Q So in a digital cellular network, what -- 09:49:47 when you transmit data, what -- what form does that data take? Is -- does it have to take the form of data packets?
A The standards dictate the form. So there are different schemes. There's time division 09:50:16 multiplexing, which was the next evolution after frequency division. I would say, yes, the majority of those are probably packet based.
Q Are there any digital cellular networks that are not packet based? 09:50:32
A I don't know. That would be a pretty sweeping statement for me to make without looking into it a little bit more.
I can't think of an example off the top of my head, but I don't want to say no for sure because I 09:50:49 would have to look into it.
Q Sitting here today, you can't think of any digital cellular networks that are packet based -- that are not packet based? Let me -- let me start over. 09:51:04

Sitting here today, you can't think of a digital cellular network that is not packet based, correct?
A Correct, but that's not -- I'm not saying that they don't exist, just that I can't think of 09:51:15 one.
Q So you said in a cellular network, you can either transmit voice data or non-voice data, right?
A Right.
MR. KAPLAN: Object to form. 09:51:35
BY MR. PAK:
Q So in a cellular network, is -- is voice data transmitted differently than non-voice data? Do they take different paths?
MR. KAPLAN: Object to form. 09:51:50
THE WITNESS: Well, it kind of depends. If you're communicating with somebody else on another cellular phone, for example, the path between you and the other person may be different because of the way cellular networks work. If you're using your 09:52:09 phone to send data to a device in your house, that would be a different path as well.
So I guess I wasn't fully clear on your question.
////

BY MR. PAK:
Q I want to go back to the slide here. It says:
"Data network is often a euphemism for packet network." 09:52:36
Do you agree with that statement?
A I do not.
Q And you disagree with the statement because a data network is any type of network that carries data; is that -- is that correct? 09:52:52
A That's correct. And the data can be in many different forms and it could be analog or digital. But even within those, it can be different protocols for each one of those.
Q Is a voice network a packet network? 09:53:06
MR. KAPLAN: Object to form.
THE WITNESS: A voice network can be packet based, yes. But there are many -- the original PBX-type switches were not. Those were a voice network that was analog. And then later other 09:53:31 networks came out that are digital.
But analog voice networks still exist and are in use in many places, including elevators for safety and places where you want the internet not to fail, especially for safety applications. 09:53:47

BY MR. PAK:
Q Okay. So an analog voice network is not a packet network, correct?
A An analog -- no, it is not.
Q Is a digital voice network a packet network? 09:54:01
A As I said before, most of them are. There might be examples where they're not, but I don't know one off the top of my head. I would say most are.
Q And I want to take a look at -- let me find 09:54:20
the right slide here. I think it's PDF page 9 of the slides. The header says "Packet Network versus Circuit Network."
Do you see that?
A Yes. 09:54:44
Q So this slide says:
"Packet Network versus Circuit Network. By contrast, packet network allows small units of data packets to be individually sent to different 09:54:55
destinations."
Do you see that?
A I do.
Q Can you send data packets over a circuit network? 09:55:04

destinations."
Yes, I would agree with that.
BY MR. PAK:
Q Can a circuit network be digital or analog?
A Yes. 09:56:39
Q What's an analog -- what are some examples of analog circuit networks?
A Well, those are the original telephony products that connect to POTS, plain old telephone system lines. You still find limited -- you find 09:56:56
them in network closets of many companies or other organizations. So, yes, there are analog switching or circuit networks that still exist.
Q You said those are examples of an analog voice network, right? 09:57:31
A Right.
Q So is a voice network not a circuit network?
A A voice network --
Q Let me ask you a different question.
Is a voice network synonymous -- synonymous 09:57:49
with the term circuit network?
A No.
Q How are they different?
A A circuit network is something that requires a physical connection to be made of the sending 09:58:02

A Probably not. I'm trying to figure out what the "by contrast" means here. Is there a previous slide that contrasts to something?
Q Yeah. So in the context, you know, the header says, "Packet Network versus Circuit 09:55:32
Network." So "by contrast" here it's comparing a packet network to a circuit network; is that correct?
A Yes.
Q So unlike a circuit network, this slide says: 09:55:42
"A packet network allows small units of data packets to be individually sent to different destinations."
Is that right? 09:55:59
MR. KAPLAN: Object to form.
THE WITNESS: Right. But -- so in a digital switching -- a digital circuit network, that could also be true, right?
So I understand what they're trying to say 09:56:15
here for the purposes of this class that they're teaching, but I guess reading the sentence by itself:
"A packet network allows packets of data to be sent to different 09:56:30

location and the receiving location. You think of it as the old telephone operator plugging in patch cords. So that's a circuit network. What it carries is voice. And so I guess it's not a term that I often use, but it is a term that I guess 09:58:21
people use calling it a voice network. You could send other things over an analog switching network.
Q And you said earlier that public switch telephone network is a voice network, right?
A I said -- I don't remember what I said. The 09:58:41
public switch network can be used as -- for voice.
Q Can a public switch telephone network be used in a circuit network?
MR. KAPLAN: Object to form.
THE WITNESS: It's not to be used in. It's 09:59:05
implemented using circuit networks, or circuit network devices.
BY MR. PAK:
Q Well, let me ask you this way. Is a voice network a type of circuit network? 09:59:28
A Yes.
Q Okay. I want to introduce a new exhibit here, Exhibit 3. Just give me one minute.
(Exhibit 3 was marked for identification electronically and is attached hereto.) 10:00:11

BY MR. PAK:
Q Okay. I just uploaded Exhibit 3. Let me know when you see it.
A I see it.
Q Do you recognize this document? 10:00:23
A I recognize maybe not this edition of it, but I have seen the computer dictionary before, yes.
Q Okay. Yeah, so this is an excerpt from the Microsoft Computer Dictionary, Fifth Edition.
And you said you're not sure if you read this 10:00:44
edition, but you've looked through the Microsoft Computer Dictionary before, right?
A Yes, I have.
Q I want to look at page 3. At the bottom, do you see a definition for a data network? 10:01:04
A Yes.
Q Could you please read that definition for the record?
A
"A network designed for 10:01:15
transferring data encoded as digital signals, as opposed to a voice network, which transmits analog signals."
Q So like the Cornell University slide we just 10:01:25

looked at, the Microsoft Dictionary distinguishes a data network from a voice network, correct?
MR. KAPLAN: Object to form.
THE WITNESS: That's what it says.
BY MR. PAK: 10:01:48
Q Do you agree with this definition of data network from the Microsoft Computer Dictionary?
A I agree with parts of it. A network designed for transferring data. But I don't agree that it has to be digital. 10:02:00
Q What does transferring data mean?
A In this context, I think because it's Microsoft, it means -- I assume it means data from one computer is moved to another computer.
Q So it talks about sending and receiving data, 10:02:31 right?
A I don't -- maybe transferring means -- to me means taking it from one place to another. I don't see anything in this definition that implies it's bidirectional. 10:02:53
Q What do you mean by "bidirectional"?
A Sending and receiving, as you said, between two devices, for example.
Q Okay. So this definition, you disagree that a data network is limited to digital signals, right? 10:03:29

A Correct.
Q Why do you disagree?
A Because I think we talked about several examples of networks that carry analog signals, and so it's not an opinion. I mean, the existence of 10:03:47 those networks proves it doesn't have to be digital.
Q And earlier, you know, as we discussed, your opinion is that a voice network can transmit analog signals, but it can also transmit digital signals; is that correct?
A Yes.
MR. KAPLAN: Object to form.
THE WITNESS: Yeah, I agree with that.
BY MR. PAK:
Q Okay. Is local area network a term of art? 10:04:17
A Yes, it is.
Q Before Google engaged you as an expert for this matter, did you have an understanding of what local area network means?
A Yes, I did. 10:04:31
Q What was that understanding?
A It is a -- again, infrastructure or medium for connecting multiple devices for the purpose of exchanging data.
Q What are the types of devices that can be on 10:04:50

a local area network?
A They can be -- because I work a lot with studios and other things, it can be mixing consoles, loudspeakers, computers, microphone preamplifiers, printers. There's a very large list of things it 10:05:16 could be on this kind -- on a local area network.
Q A local area network can be wired or wireless, correct?
A Yes.
Q What are the types of cables used to transfer 10:05:29 data over a wired local area network?
A It's similar to the list that we talked about before in terms of data networks. It's copper and all types of copper connections, including audio cables, speaker cables, Ethernet, coaxial cables, 10:05:53 optical cables. That's probably a good list.
Q So if a speaker is connected to the Sub Equalizer, for example, via a RCA cable -- let me start over.
So if a speaker is connected to another 10:06:24 device, such as the Sub Equalizer via RCA cables, is that on a local area network?
A Yes. Those are exchanging data.
Q Does a local area network require devices to transfer data in a certain format to communicate 10:06:51

with another device?
A It does. The devices on that network have to all have an agreed-upon representation of the data or use an appropriate translator to make it understandable to them, but yes. 10:07:08
Q So devices on a local area network have to communicate using a specific network protocol, right?
A Yes.
Q What are those network protocols? 10:07:25
A So there are -- again, because I come from the audio world, there are modulation protocols, such as pulse code modulation, pulse width modulation, optical data protocols, which are digital. Well, all the ones I mentioned are 10:07:49 digital.
And then there are also the -- if we're talking about printers and computers, then there are the TCP internet protocols.
Q Are these analog protocols or digital 10:08:04 protocols?
A Well, I guess I don't think of a protocol as analog or digital. It's -- there are protocols for analog data and there are protocols for digital data. Perhaps that's what you meant? 10:08:36

Q Yeah, that's what I meant, actually.
What are the protocols for analog data for a local area network?
A So they're modulated -- so FM is -- not the radio kind of FM, but frequency or amplitude 10:09:02 modulation of audio data can be sent over cables and demodulated at the receiving side and be converted back to audio. That's one that comes to mind for analog.
Q Are there any other protocols for analog data 10:09:26 over a local area network?
A The method that I talked about before for the 1G cellular networks, frequency division multiplexing, that can also be applied to wired local area networks as well. 10:09:50
Q What are the protocols for digital data over a local area network?
A It depends on the data. So if it's -- again, if we're talking about multimedia audio data, those can be the ones that I mentioned before, the pulse 10:10:12 code or pulse modulation or optical, SPDIF.
If we're talking about computers and printers, those are TCP-type protocols. But there are others. There are peer-to-peer connections that can happen. 10:10:36

Q When you transmit digital data over a local area network, does that data have to take the form of digital data packets?
A No, it doesn't have to.
Q What other forms can that data take? 10:11:00
A The examples I was giving before, some kind of a modulation. So pulse code or pulse width modulation. So, no, it doesn't have to be packet based.
Q When we talked about modulations, you 10:11:30 referred to them as analog data; is that right?
A No. The one kind, frequency division, is the analog. But the -- so pulse code and pulse width, the examples I'm using here, require the translator device. 10:11:54
So let's say you have an audio device that's sending out analog audio, but you want to connect it over a local network to other devices to receive that audio, the wired network. You might convert it to digital audio and then use -- and that conversion 10:12:16 puts it in the forms of pulse code modulated or pulse width modulated audio. Most common is pulse code. It's sent over the network in that format and then the opposite operation happens at the receiving end. 10:12:37

So these converter devices are in many cases built into the audio source and receiver and sometimes they can be separate.
Q So when you convert audio into digital form in pulse code modulator or pulse width modulated 10:12:55 audio data, and you transmit that over a network, does that data have to take the form of data packets?
A No.
Q What does that data -- what form can that 10:13:19 data take other than data packets?
A You can think of it as a stream of zeroes and ones because it's digital now.
I guess the best analogy I can think of is in Morse code you can have a long beep or a short beep, 10:13:39 and so the pulses can be wide to represent, let's say, a one or short to represent a zero and then that pattern is read in by the receiving device and converts back to audio.
Q Does an infrared remote that sends infrared 10:14:00 signals to a TV amount to a coupling by way of a local area network?
A Yes. It's sending data to a TV in this case, right? So over an agreed-upon protocol. So yes.
Q So as long as data is being carried over to 10:14:36

another device using some agreed-upon protocol, you're saying that that is enough to be on a local area network; is that right?
MR. KAPLAN: Object. Form.
THE WITNESS: It's enough to be on a network. 10:14:55
Local area usually is used as a term of art to differentiate it from larger networks. But, yes, I agree.
BY MR. PAK:
Q What do you mean by a local area usually is 10:15:16
usually used as a term of art to differentiate it from large networks?
A The industry uses these terms to give an idea of the magnitude of the size of the overall network. So they are, for example, wide area networks that 10:15:41
would consist possibly of multiple local area networks and are generally considered to cover much larger areas geographically. So it's kind of a layered terminology. There are also metropolitan area networks that typically are associated with a 10:16:03
city.
There's no hard definition of where the boundary of one ends and another one begins, but one would understand that a wide area network involves a much larger geographic area than a local area 10:16:16

Q Right. So there is a difference between a data network and a local area network, right?
A No. A local area network is a data network. But it has this additional attribute that is used to compare it to larger data networks, which are called 10:18:13
wide area networks.
Q What is -- where are those additional attributes that make a data network a local area network?
A They are used in -- when making comparisons 10:18:27
between two networks to differentiate usually by the number of devices or the geographical area that is covered.
So they're all data networks, but the wide --
it's generally understood that a wider network has 10:18:48
many more devices or covers a wider geographical area than a local area network.
Q Are there any other additional attributes that make a data network a local area network?
A Not that I can think of at the moment, no. 10:19:04
Q Do you know any examples of a wide area network?
A Yes. I don't know if there's a name for it, but the Western United States internet infrastructure is generally considered a wide area 10:19:37

network.
Q So local area network covers a limited area compared to a wider network; is that right?
A I wouldn't say limited. It's just smaller than the wide area network. All networks are 10:16:42
limited by area. Wide area networks are also limited, perhaps to planet earth. But it's just a terminology for relative size. So one would understand a local area network has fewer devices on it than a wide area network. 10:16:57
Q Let me ask you this way, then. A local area network covers a limited geographical area; is that right?
A As I said, a smaller geographic area. It can be quite large. That's why I objected to "limited." 10:17:16
It can be pretty big. And then you say, okay, what about wide? Wide area network would be bigger.
Q Correct, right. So local area network covers a smaller geographical area than a wide area network; is that right? 10:17:32
A Yes.
Q Is there a difference between a data network and a local area network?
A Well, a local area network is a subset of the data networks. 10:17:56

network. Internet2 that we mentioned before is a wide area network.
Q Do you know any other examples of wide area networks?
A I would say satellite networks perhaps that 10:19:51
cover a part of the globe under their view are also wide area networks.
Q How do you transmit data over a satellite network?
A In multiple ways. It could be radio 10:20:22
frequency based modulation or it could be packet based, like it is for cell phones or cell networks.
Q Can you transmit analog data over a satellite network?
A Analog data -- I'm trying to think of -- for 10:20:41
example, a short-wave radio is a kind of a network that uses analog data over large distances. It's possible that it's rebroadcast through satellites. I'm not sure. I think technically you can.
I can't think of an example at the moment, 10:21:13
but there's no reason that you couldn't.
Q Do you know any satellite networks that transmit analog data?
A Not off the top of my head. I mean, I know an old example -- communication with the Apollo 10:21:33

astronauts was done through radio waves. Perhaps eventually that became digital. But, no, I can't think of an example off the top of my head.

Q Does data that is transmitted over a satellite network have to take the form of data packets? 10:21:55

A I don't think that's required, no.

Q What other forms of data can be transmitted over a satellite network?

A There are other modulation schemes that can be used. Radiofrequency modulation schemes can be used to transmit data over satellites. 10:22:09

MR. PAK: How about we take a break, a quick break? Maybe come back in five minutes. Is that okay? 10:22:41

THE WITNESS: Sure.

THE VIDEOGRAPHER: We are off the record at 10:22 a.m.

(Recess.)

THE VIDEOGRAPHER: We are on the record at 10:30 a.m. 10:30:10

BY MR. PAK:

Q Dr. K., I want to explore a couple more examples regarding local area networks.

A Okay. Before we get started, before you ask 10:30:25

your question, I -- as I was walking upstairs, I thought of an example, if I could amend my previous answer.

An example of analog communication over satellites is of course the obvious one, broadcast television. Early days of broadcast television was analog signals being sent over satellite. That's an obvious one. Okay. 10:30:38

Q Does a cell phone communicate with a Bluetooth headset amount to a coupling by way of local area network? 10:31:07

A Yes.

Q Wasn't Bluetooth a type of personal area network?

A Again, these definitions are kind of arbitrary in the sense that there is no hard line of distance that goes from one to the other. It's a small local area network, but if I have a speaker 20 feet away from me communicating by Bluetooth, then maybe that could be a local area network. It's not a hard definition. 10:31:26 10:31:46

Q Does local area network cover a broader geographical area than a personal area network?

A By consensus of people in the field thinking of it that way. It's not something technical that causes that. But yes. 10:32:07

Q Are there any other differences between a local area network and a personal area network?

A Probably the number of devices in a local area network would be higher than the number of devices in a personal area network that are possible. 10:32:24

Q Are there any other differences between local area network and a personal area network?

A I can't think of one, no. 10:32:36

Q So earlier you said, you know, communicating over two walkie-talkies could amount to a coupling by way of a data network, right?

A Yes.

Q And that's because you can carry data from one walkie-talkie to another walkie-talkie, correct? 10:33:04

A Correct.

Q What if I just had, you know, two cups on a string and I used that to communicate with George, who is right by me, is that on a data network? 10:33:25

MR. KAPLAN: Object to form.

THE WITNESS: That's a bit of an extreme example, but if your voice carried over the string and the string was carefully selected and there was no background noise, yeah, it's data. Your data is 10:33:46

getting across to somebody else to another device. Not a very sophisticated one, but yes.

BY MR. PAK:

Q So as long as two devices or two nodes carry data, that's going to be on a data network, in your opinion? 10:34:02

A Yes.

MR. PAK: Okay. I'm going to introduce Exhibit 4. I actually uploaded it on the break and marked it as Exhibit 4. Just let me know when you see it. 10:34:27

THE WITNESS: I see it.

(Exhibit 4 was marked for identification electronically and is attached hereto.)

BY MR. PAK: 10:34:45

Q Do you recognize this document?

A Yes.

Q This is your -- this is one of your publications; is that right?

A That's right. 10:34:51

Q And the title says, "RMI System: Internet Meets the Future Home Theater," right?

A Correct.

Q At a high level, what is this publication about? 10:35:07

A This describes a set of experiments that actually relates to the Internet2 discussion that we had earlier. RMI stands for Remote Media Immersion. And for several years there was -- I was a faculty investigator and then eventually a deputy director of the National Science Foundation Engineering Research Center that was established at USC, and this was one of the kind of capstone experiments that we did to push the limits of multimedia at the time. This was in the late 1990s. 10:35:30 10:35:47

And so this paper talks about what technologies would you -- would one need and how would we use them to deliver what appears like high quality representation of reality to somebody that is far away. 10:36:06

Q What was your contribution with respect to this paper?

A So several parts. It was the algorithms for capturing audio on one end. Algorithms for delivering it on the other end. Those were, I would say, individual contributions. 10:36:32

And then there were collaborative contributions in working with the researchers and computer networks to develop methods together that met the requirements of multichannel audio, 10:36:48

immersive audio, that were very different from the requirements of sending faxes and e-mails in terms of quality of service, forward error correction, and other things like that.

Q Okay. And I want to look at PDF page 4, Figure 1. 10:37:12

Do you see that?

A Yes.

Q Did you design this architecture shown in Figure 1? 10:37:29

A This architecture is -- this is all off-the-shelf equipment. It's computers and hard disks and Ethernet switch and computers at the other side. So this was not -- we discussed how to put them together and all agreed that this is how we would need to do it in order to achieve our goal. But the individual pieces are off-the-shelf components. 10:37:58

Q Okay. And, you know, I want to take a look at the bottom of page -- PDF page 3 here, the last paragraph. It says: 10:38:12

"Figure 1 (next page) shows the server cluster architecture, which can harness the resources of many nodes and many disk drives per node 10:38:26

concurrently."

Then the last sentence on that page says:

"Each cluster node is attached to a local network switch with a fast or Gigabit Ethernet link. The nodes communicate with each other and send the media data via these network connections. We connected the local switch to both a wide area network backbone to serve distant clients and a local area network, LAN, environment with local clients." 10:38:41 10:38:51

Do you see that?

A I do.

Q So looking at Figure 1, what are the cluster nodes? 10:39:05

A What are in terms of --

Q What are the cluster nodes with respect to Figure 1? Can you point to them or show me -- tell me -- 10:39:28

A It's the ones that are labeled Node 0, Node 1, Node 2, Node N. It was scalable.

Q What is a node?

A A node is I think a network -- people speak for a connection of a device to the point of 10:39:53

connection between a device like a computer or server to the network.

Q And a local switch described in your publication is the Ethernet switch shown in Figure 1; is that right? 10:40:10

A Right.

Q And the internet showing here in Figure 1 represents the wide area network backbone described in your publication; is that right?

A Correct. 10:40:22

Q Does Figure 1 also depict a local area network environment with local clients?

A Well, the personal computers shown there are on a local area network. The ones where the nodes were indicated. 10:40:45

Q So the nodes here represent personal computers; is that right?

A I think node is a term which -- it's the device -- nodes to me represent connections, the connection points. They happen to be parts of a computer, an interface that the computer has to create that node. 10:41:11

So I wouldn't -- the computer itself is not the node. I think the fact that it has a connection at that point makes -- creates a node as kind of an 10:41:31

entryway to that network.
Q I want to take a look at the bottom paragraph, the left column of PDF page 4. The last sentence says:
"VBR streams enhance the rendering quality, but they generate bursty traffic on a packet-switched network such as the Internet. In turn, this can easily lead to packet loss due to congestion." 10:41:54 10:42:04
Do you see that?
A Yes.
Q Your publication here teaches that the Internet is a packet network, correct?
A Yes. 10:42:14
Q Looking at the last sentence of the next paragraph, it says:
"To avoid traffic bottlenecks, each node transmits the data blocks that it holds directly to the clients via RTP. Hence, each client will receive RTP data packets from each server node within the cluster." 10:42:29
Do you see that?
A I do. 10:42:41

Q What is RTP?
A I think it's retransmission protocol. It's a type of protocol that enables error correction. In case there are lost packets, they are re-requested before they're stitched back together to avoid dropouts. 10:43:00
This was one of the big things we had to worry about. You don't want audio dropouts. It does not make for a high-quality experience.
Q Is RTP a type of internet protocol? 10:43:12
A No. I would say UDP is an internet protocol, User Datagram Protocol, UDP is a type of internet protocol. And you can enable, if you will, or include in it a method like RTP that provides for the ability to correct errors that happen because of lost packets. 10:43:43
Q Does UDP require data to be transmitted or received in the form of data packets?
A Yes.
Q So does RTP, right? 10:43:59
A RTP is -- it's not a transmission -- it's not the same. Yes, RTP operates on packets to figure -- and requests retransmission of ones that are missing based on what it was expecting, in simple terms.
Q Okay. So looking at Figure 1, the nodes 10:44:26

shown in Figure 1 transmit data packets over a wide area network; is that correct?
A Well, they first go over a local area network into the switch, and then the switch multiplexes them all together and puts them onto the line that goes to the wide area network, as shown at the top through fast Ethernet or Gigabit Ethernet. 10:44:55
Q Sure. So let me correct that here.
So nodes communicate with the Ethernet switch over a local area network, correct? 10:45:09
A Correct.
Q And these nodes send data packets to the internet switch; is that correct?
A Yes. In this architecture, yes.
Q And in this architecture, the Ethernet switch connects to the -- or communicates over the internet and sends data packets over the internet; is that correct? 10:45:21
A Right. Where it says "internet backbone routers," those are -- exist -- there's a connection in USC's IT building and that's -- so if we went from there to that router, then that router then has a direct line to the wide area internet. In this case, it was Internet2. Not the general internet, but a similar type of network. 10:45:39 10:45:58

Q Okay. I want to introduce Exhibit 5 here. Give me one second.
Okay, I just uploaded Exhibit 5 and marked it as Exhibit 5. Let me know when you see it.
A I see it. 10:46:21
(Exhibit 5 was marked for identification electronically and is attached hereto.)
BY MR. PAK:
Q Do you recognize this document?
A Yes. It's one of my patents. 10:46:33
Q So you're a co-inventor of this patent, correct?
A Yes.
Q And the patent number is 8,705,764, right?
A Yes. 10:46:47
Q At a high level, what does this patent generally disclose?
MR. KAPLAN: Object to form.
THE WITNESS: We were trying to solve a problem that happens when you take audio -- you start with analog audio and then you digitize it into a high quality digital form. And then in order to store it perhaps on a portable device, one of many different data compression algorithms are used. 10:47:05
MPEG being the most popular, but there are others 10:47:30

like AAC.
The result of that compression is that the higher frequencies of sound that were in the original tend to be discarded in the name of bandwidth savings. And so this patent teaches a 10:47:44
method to recreate the lost high frequencies using information that is in the lower frequencies that did not get discarded.
BY MR. PAK:
Q I want to focus on Column 11. It's on PDF 10:48:04
page 21, lines -- lines 55 to 60. It's the last sentence before the last paragraph.
Could you please read those lines for me for the record.
A Is this the "Various embodiments" paragraph? 10:48:25
Q The sentence right above it.
A "The connectivity between the modules"? That one?
Q Yes, that one.
A Okay.
"The connectivity between the modules and/or components within the modules may be provided using any one of the connectivity methods and media that is known in the art, including, 10:48:52

but not limited to, communications over the internet, wired or wireless networks using the appropriate protocols."
Q So it talks about communications over the 10:49:01
internet using the appropriate protocols. What are the appropriate protocols communicated over the internet?
A It's been a little while since I've seen this, so just give me a second to take a look and 10:49:18
put it in context.
Q Sure. Go ahead, take your time.
A Yeah. Okay. It's all coming back.
Q Okay. So let me re-ask the question here.
What are the appropriate protocols to 10:50:17
communicate over the internet?
A It's what we talked about before. If it's the internet as we have it today, it's TCPIP or peer-to-peer or UDP, as we just saw.
Q Are there any other protocols? 10:50:39
MR. KAPLAN: Object to form.
THE WITNESS: There are others. There's -- let's see. OSI is another one, Open System Interfaces. There are probably others I'm not remembering. There are a number of these internet 10:51:11

protocols.
To be clear, the patent is really not about connecting -- it's just saying that the modules that we're discussing here that are going to do advanced audio processing don't necessarily have to be in one 10:51:30
device, they can be spread out, distributed. That was the point of that paragraph.
BY MR. PAK:
Q What is the OSI protocol?
A It's a -- the best way to describe it, it's 10:51:48
an attempt at abstracting the individual layers that are required in a network system all the way from the hardware layer to the firmware to the software that needs to run on top of it, to the physical connections, in a way that provides a more uniform 10:52:16
way for people that are trying to send data over these kinds of networks without having to know exactly what type of device was there.
So it moves it up to be a more abstract representation of the interface of the network. I 10:52:34
believe there are seven layers in it that -- in that stack.
Q Does the data that is transmitted using the OSI protocol require data packets, data transmitted in the form of data packets? 10:53:01

A Yes, it's a packet-based system.
Q Okay. I want to look at Column 9, lines 20 to 24 of your patent. And I'm just paraphrasing here, but it says that the output is characterized by a transfer function. 10:53:27
Do you see that?
A I do.
Q What does the term "characterize" mean?
A In this context it means that -- so we're talking about a system. A system has inputs and 10:53:43
outputs. And typically when you do system analysis, you want to find a way to describe the output in terms of the input signal.
And so the transfer function in this context says that if I have -- if I know what the amplitude 10:53:58
level was to this box and I know what the transfer function is, then I can tell you what the output is.
Q Do you know any words or phrases that are synonymous with the term "characterize"?
MR. KAPLAN: Object to form. 10:54:17
THE WITNESS: I'm trying to think of it in this context, and not just generally.
What it really means here is mathematically described. Because we're talking about this equation here. That would be the closest I can 10:54:41

think of.
BY MR. PAK:
Q Can you think of any other words or phrases that are synonymous with "characterize"?
A Not off the top of my head, no. 10:54:53
Q But "describe" would be one of the terms that is synonymous with "characterize," right?
MR. KAPLAN: Object to form.
THE WITNESS: Yeah, but I don't want to -- in math we say mathematically described, so I would be 10:55:11 more comfortable keeping it that way.
BY MR. PAK:
Q What about defined?
MR. KAPLAN: Object to form.
THE WITNESS: Defined has a different meaning 10:55:24 to me. A definition in math or applied math means that you're making some assumptions and defining them. But that's not what is happening here.
This is a -- an equation that has certain elements. And so the system is characterized by 10:55:47 this transfer function. So I think describe mathematically is more accurate.
BY MR. PAK:
Q What if I say -- what if we change "the output is characterized by a transfer function" to 10:56:04

"the output is represented by a transfer function," would that be accurate?
MR. KAPLAN: Object to form.
THE WITNESS: I don't think so because "represented" to me means it's not the thing, but 10:56:23 it's being represented by something else. And that's not technically correct here. This H function is the function.
BY MR. PAK:
Q What if you say "the output indicates a 10:56:42 transfer function," would that be incorrect?
A No. That would be something completely different and it would indicate that there might be an output or something, but that's not -- this is a deterministic system, and so no. 10:57:00
Q Well, looking at the equation here, the output Y equals the transfer function times the sinusoid input, S-I-N-U-S-O-I-D.
So the output function here indicates the transfer function and the sinusoid input, right? 10:57:35
A No.
Q It provides some kind of indication of it?
A No, no. This is a way to calculate the output function. So it is calculated by multiplying the transfer function with the complex sinusoid. 10:57:53

Q Okay. Let me try to introduce another exhibit here.
I just uploaded a new exhibit and marked it as Exhibit 6. Let me know when you see it.
A I see it. 10:58:25
(Exhibit 6 was marked for identification electronically and is attached hereto.)
BY MR. PAK:
Q Do you recognize this document?
A Yes, it is another one of my publications. 10:58:35
Q The title of the publication is "High Quality Multichannel Audio Over the Internet," right?
A Yes.
Q What was your contribution to this publication? 10:58:51
A These are two students in the center. One of them was in my group and the other one was in the networking group. And this was a paper that -- similar to the previous one, it was trying to figure out ways to transmit high quality audio over the 10:59:09 internet.
And the reason that it was an interesting topic was that it was really not possible to transmit high quality audio over the internet, at least not in the early days. And so this paper 10:59:23

shows some ways of doing that.
Q Let's take a look at the abstract. The second sentence here says:
"We present a robust scalable architecture for delivering 10:59:44 uncompressed multichannel audio over high bandwidth ATM networks."
Do you see that?
A I do.
Q Is an ATM network a type of data network? 10:59:54
A Yes.
Q Is that because an ATM network carries data?
A Actually, I should revise it.
ATM network is a -- is a protocol for transmitting data over data networks. It stands for 11:00:10 Asynchronous Transfer Mode, so it's a method of transmitting data over networks, over data networks.
Q So an ATM network is not an actual network, it's a protocol; is that right?
A Right. There's a -- there's a network 11:00:29 architecture that has connectors and switches and things that have to support the ATM protocol in order to have an ATM network of devices.
Q Okay. Looking at the abstract, it says:
"Performance results from our 11:00:52

implementation on a high-speed local area ATM network are presented that identify the effects of audio packet size, buffering, and network latency on the quality of multichannel program material."

Do you see that?

A I do.

Q So is a high-speed local area ATM network a network protocol or a data network? 11:01:16

A No. This is -- this sentence is kind of conflating to me. It's a local area network running the ATM protocol for purposes of this experiment.

Q Got it.

A So it requires different hardware. A TCP local area network would require a different hardware than an ATM protocol local network. Sometimes they can be in the same box, but usually it's different. 11:01:32

Q So your publication here is talking about a local area network that uses the ATM protocol; is that correct? 11:01:48

A Right.

Q Did you design and implement the local area network that uses this ATM network described in this 11:02:04

publication?

A If you look in Figure 1 of the next page, this is a similar simpler diagram than -- compared to the one that we saw before with the RMI network.

So we designed this architecture or this set of components that are all off-the-shelf audio parts, and you can see the ATM adapter inside the computer that allows you to put out onto the network data that follows the ATM protocol. And then there's the playback application on the top. 11:02:28 11:02:54

So, yeah, we designed this architecture, but it consists of computers and switches and wires that are off the shelf and software that we put inside it to do what we -- to run this experiment.

Q And when you say that "we designed," are you saying that you designed the network described in Figure 1, for example? 11:03:09

MR. KAPLAN: Object to the form.

THE WITNESS: The way collaborative papers work is this is a group, you know, we have group meetings. We designed the experiment and then have regular kind of intervals of meeting and discussing. 11:03:31

So if you're asking who designed each individual part, it's hard to say because we had joint code sessions where we all sat in front of the 11:03:53

screens, do this, change that, let's try this exercise. And so it's hard to break it up into an individual.

BY MR. PAK:

Q Yeah, understood. 11:04:04

So how about maybe -- let's take a look at the last page, PDF page 6, and there's an acknowledgment section. It says:

"The authors would like to thank Dr. Sherali Zeadally" -- 11:04:18

I might be botching that name.

A No, that's all right.

Q So let me read it again.

"The authors would like to thank Dr. Sherali Zeadally for his work in its design and implementation of the ATM network." 11:04:30

Do you see that?

A I do.

Q So Dr. Zeadally is the one who actually designed and implemented the local area network that uses the ATM network described in this publication, correct? 11:04:39

A Well, so he was a collaborator on this. The second author in the paper was a joint student, so 11:04:54

he was -- Mr. Zhu was Dr. Zeadally's student. Dr. Zeadally's lab was doing experiments with ATM networks, and they had the infrastructure that we were looking for in terms of switches and the right cables and so on. 11:05:17

So I think this is kind of -- because he wasn't part of this particular experiment, he is not a co-author, but we used his lab where he had kind of a tabletop network for us to experiment with these protocols. 11:05:34

Q Okay. I want to take a look at PDF page 3. And there's a header 3 that says, "Experimental Results".

A Yes.

Q Could you read the first two sentences under that header? 11:05:51

A Yes.

"In order to assess the effects of packet size and buffer size on the quality of the audio streams transmitted through the network, as well as on the delay introduced by the system, we performed a series of tests." 11:06:01

The next one as well? 11:06:13

Q You know, that's fine.
A Okay.
Q So this publication discloses a system architecture in which data packets are transmitted over a local area network that uses the ATM protocol; is that correct?
A Well, this publication was not intended to disclose the architecture. It was more intended to use the architecture to experiment with what needs to be changed or fixed or, you know, what matters in high-quality audio transmission over a network that has the bandwidth and the architecture that could enable it. We just didn't know what the right architecture was for transmitting audio in terms of the buffer size and packet sizes, and so on.
So it was more of an experimental paper that uses a network architecture based on the ATM system that was kind of local to us there so we could change things in it.
Q All right. So the publication describes a local area network that uses the ATM protocol to transmit data packets, right?
MR. KAPLAN: Object to form.
THE WITNESS: The publication describes an experiment that was conducted on the system we just

described.
BY MR. PAK:
Q Can you send data over a local area network using the ATM protocol in the form of data that is not a data packet?
A No. The ATM protocol is a packet-based protocol.
Q Okay. I want to introduce another exhibit here, so just give me a minute.
Okay. I just introduced Exhibit 7. Let me know when you see it.
A I see it.
(Exhibit 7 was marked for identification electronically and is attached hereto.)
BY MR. PAK:
Q Do you recognize this document?
A Yes.
Q At a high level, what does this publication describe?
MR. KAPLAN: Object to form.
THE WITNESS: I don't know if this was an actual publication. This was more of an internal -- more kind of like a white paper. I don't remember the origin of it. It could be part of a report that was presented to the annual review by the National

Science Foundation.
It's related to an experiment that we did with the New World Symphony based in Miami. And it was similar to the RMI experiment trying to -- trying to deliver high-quality performance that is convincing you to feel like you're in the concert hall with them, even though you are 3,000 to 4,000 miles away.
We actually demonstrated this live to an audience of several hundred people. It was the first time that it had ever been done at that scale.
BY MR. PAK:
Q This publication talks about HYDRA. It's abbreviation for high resolution live streaming. What is HYDRA?
A So HYDRA was -- Professor Zimmerman that you see there at the top, his laboratory and his research group was experimenting with using similar things that we talked about before using the UDP protocol with error correction to deliver high-quality content and overcome the problems that normally arise with traditional ways of doing that, for example, TCP, which were not designed for streaming media. They were designed for offline -- it's okay if you can wait a second before you get

your e-mail, but you can't wait to get the next audio packet, right? So that's what HYDRA is. It was trying to do that.
Q Okay. And I want to take a look at the second section, the Statement of Project Goals. And in the middle of that section, the publication says:
"This project focuses on the design of a system that enables HD quality video and multiple channels of audio to be streamed across an IP-based network with commodity equipment."
Do you see that?
A Sorry. The middle section -- I missed where you pointed.
Q Yeah. So in the middle of Section 2, Statement of Project Goals --
A Oh, yes. I see it.
Q Okay. What is an IP-based network as described in this publication?
A It's an internet protocol based network, which is kind of a very common type of protocol for transmitting data over the internet.
Q Okay. And the second page here, Section 4, the second to last paragraph -- second sentence --

second to last sentence in the first paragraph, it says:
"The transmission subsystem uses the Realtime Transport Protocol, RTP, on top of the Universal Datagram Protocol, UDP."
Do you see that?
A Yes.
Q So this publication is talking about an IP-based network that uses UDP; is that right? 11:12:55
A That's right. Those are subsets of an IP-type network, just as TCP is.
Q I want to take a look at the system architecture shown on Figure 1 of that page.
A Yes. 11:13:14
Q Do you see the stream transmitter/receiver in the figure?
A Yes.
Q What does the stream transmitter/receiver do?
A That's -- that's a piece of software that's 11:13:25 kind of like the core of the HYDRA system. It takes in multiple channels of microphones in this example of a live recording, multiple cameras, and kind of packages them together to send over the network by paying attention to things that we talked about 11:14:03

before, error correction and other things.
Q What is the form of data that is transmitted or received over the IP-based network disclosed in this system architecture?
A Well, it's what it says on the line above RTP 11:14:19 over UDP.
Q Right. So this system architecture is designed to transmit or receive data packets, right?
A Well, it's using an existing network that is based on data packets. 11:14:38
So we had to take the data that is coming in in different forms, audio and video, and convert it to match what the network expects, in this case, data packets.
Q Okay. I want to introduce another exhibit 11:14:53 here. Just give me one minute.
Okay, I just uploaded a new exhibit and marked it as Exhibit 8.
(Exhibit 8 was marked for identification electronically and is attached hereto.) 11:15:27
BY MR. PAK:
Q Let me know when you see it.
A I see it.
Q Do you recognize this document?
A Yes. 11:15:39

Q This is another one of your publications, correct?
A Yes.
Q What does this publication describe?
MR. KAPLAN: Object to form. 11:15:51
THE WITNESS: This is another one of the same kind of sequence of experiments we've been discussing, which is high fidelity picture and sound transmitted in a synchronized way over the Internet2 in this case. This particular one was trying to 11:16:08 understand what happens when you have an interactive section.
So it's one way to stream in one direction to an audience far away. It's another way when you need to have two-way communication. Because in this 11:16:27 example, we had two musicians and they are supposed to play a piano piece together, each on their own piano. And musicians require, of course, very accurate timing between them in order to perform.
So by adjusting -- artificially adjusting the 11:16:44 delay between the two of them is what -- how they would hear the other side. And we were looking for what the limits are of human performance over networks.
////

BY MR. PAK:
Q I want to take a look at the first paragraph on the right column of page 1. After the first sentence, it says:
"Network latency is an unavoidable fact of interaction environments over the Internet."
Do you see that?
A Yes.
Q What is network latency? 11:17:22
A It's the amount of time it takes for information that was sent from one side of the network and how long it takes to be received at the other side. It is not instantaneous and it depends on distance usually. That's what we call latency. 11:17:39
Q Why is network latency an unavoidable fact of the interaction environments over the internet?
A Because of the protocols that are in place that have been created to ensure, for example, that data isn't lost. Sometimes that takes longer to 11:18:04 make sure that it's all collected before it's presented to the other side. That's one reason.
The other reason is every time you go -- it's not a direct connection between two distant places. You go through switches on the network. And so 11:18:22

switches also, as they pass the data through, introduce delay in order again to avoid -- because they're doing something to make sure not to lose anything. So the connection of all these boxes introduces some delay. 11:18:37

It's not that dissimilar from an analog network over long distances. Audio doesn't travel at the speed of light. The longer the cable is -- it has to be pretty long, but you see delays in analog circuits as well. 11:18:53

Q When you say "switches" on a network, are you talking about packetized -- packet-based network switches?

A In this case we're talking about the internet, so that is a packet-based system, yes. 11:19:06

Q Okay. And the bottom of PDF page 1 under subsection "Low Latency Audio," it says:

"The challenges in transmitting audio over the internet are packet loss and fluctuations in transmission 11:19:24 time."

So, you know, is packet loss, you know, inevitable in a system that communicates over the internet?

MR. KAPLAN: Object to form. 11:19:42

THE WITNESS: Inevitable? There are ways to mitigate it, and trade-offs. So you could make it not happen at all. If you were okay incurring more latency, just wait longer for everything to arrive. But that's the trade-off. So in a realtime system 11:19:59 where you don't have the luxury of waiting, they are inevitable in that sense, yes.

BY MR. PAK:

Q Okay. But when we talk about devices that communicate over the internet, we're talking about 11:20:20 devices that send or receive data in the form of data packets, right?

A Well, in that diagram, the two end devices, the one at Diagram 1 we were talking about, is that -- I'm sorry. That was in the previous 11:20:38 example? Yes, it was. Let's see if it's here as well.

The devices that connect to the internet, let's say the computer that connects to the internet on the sending side takes in analog data from the 11:20:53 real world, converts it first to digital, and then it has to convert it to a form -- you know, if we're doing this experiment over a different kind of network, we'd have to convert to whatever that network expected. 11:21:11

In this case, because this was an Internet2 experiment, we had to convert it to the UDP style -- the IP-type packet based form so that we could use that network.

And then the opposite procedure happens at 11:21:23 the other end. We can't experience packets. We can experience picture and sound. So we have to convert it back.

Q So once data is converted from analog to digital and sent over the internet, that data has to 11:21:35 take the form of packets; is that right?

A If we're going to use an internet -- existing internet infrastructure, yes.

Q Okay. I want to take a look at Figure 1 shown on PDF page 2. 11:22:02

A Okay.

Q And the top of Figure 1 says:

"Data sources produce packetized realtime data streams."

Do you see that? 11:22:16

A Yes.

Q What are the data sources in Figure 1?

A All kinds of multimedia capturing devices. Camera, microphones -- cameras, microphones, in this case haptic sensors. 11:22:38

Q So data from these data sources are first converted to digital form, right, and then sent in packets over the internet; is that correct?

MR. KAPLAN: Object to form.

THE WITNESS: Yes. Yes. That's what those 11:23:08 little rectangles are trying to indicate, that data has been packetized in realtime using RTP, as it says there.

BY MR. PAK:

Q Okay. You know, I'm going to start 11:23:26 transitioning over to discussing your declaration. So why don't we take a ten-minute break.

Is that okay?

A Sure.

THE VIDEOGRAPHER: Off the record at 11:23:34 11:23 a.m.

(Recess.)

THE VIDEOGRAPHER: We are on the record at 11:36 a.m.

BY MR. PAK: 11:36:18

Q Dr. K., you submitted a declaration on June 1, 2021, for this matter between Sonos and Google, correct?

A Correct.

Q You were retained as an expert to offer 11:36:35

opinions on claim construction related to the asserted patents in this case, right?
A Yes.
Q When were you contacted to offer your opinions for claim construction related to the asserted patents? 11:36:46
MR. KAPLAN: Object to form.
THE WITNESS: Specific to claim construction, the discussions probably started a month ago, I'm guessing. 11:37:01
BY MR. PAK:
Q So you were -- were you first contacted to offer opinions on claim construction in May; is that correct?
MR. KAPLAN: Object to form. 11:37:13
THE WITNESS: Again, I don't have the dates in my head. It was after I was retained for the case, obviously, but sounds about right. It could have been in April.
BY MR. PAK: 11:37:26
Q Okay. Were you informed of what each party's construction was at the time?
A At the time -- I was eventually, but not at the time, no.
Q What did you do to prepare for your 11:37:45

declaration?
A I read the patents. I read through the patent office -- office actions. Some of the prior art. That's basically it. And then used knowledge, my experience in the field to help form my opinions. 11:38:12
Q Did you consider the cited references in the -- did you consider the cited references in the office actions?
A Oh, the office actions.
I'm trying to remember. I read through a lot of documents. I don't know if that -- for sure. I tried to be as complete as possible. I don't know if I did or not. Probably. 11:38:36
Q Do you understand that Sonos's experts, Dr. Almeroth and Dr. Schmidt, submitted declarations on claim construction in this case? 11:38:59
A Yes.
Q Did you read Dr. Almeroth's declaration?
A I did.
Q Did you read Dr. Schmidt's declaration? 11:39:14
A I believe I did.
MR. PAK: And, you know, just for the record, I just noted Dr. Schmidt is actually on this Zoom call. So I just wanted to point that out. I think he joined a little bit late, but he is just here for 11:39:37

observation purposes.
BY MR. PAK:
Q Did you consider any other material to prepare your declaration?
A Other than what I mentioned, no. 11:39:51
Q All right. I'd like to introduce your declaration here now as Exhibit 9. I marked it as Exhibit 9 and uploaded it. So just let me know when you see it.
A I see it. I just wanted to ask you a question. I have a clean copy of the -- from the 28 pages of the part that I wrote on my desk. Sometimes it's easier to go to a page that way than it is -- if that's okay with you, I have it right here. It's not marked. It's just a clean printout. 11:40:36 11:40:49
(Exhibit 9 was marked for identification electronically and is attached hereto.)
BY MR. PAK:
Q Yeah, that's okay.
Can you look at the last page of your declaration or PDF page 28 of Exhibit 9. 11:40:53
A Yes.
Q Is that your signature?
A It's my electronic signature, yes.
Q I forgot to ask you, is this a true and 11:41:17

correct -- true and accurate copy of your declaration submitted June 1, 2021?
A Yes, it is.
Q Okay. And the opinions set forth in this declaration are yours, correct? 11:41:32
A Yes.
Q To date, this is the only declaration that you submitted in this case, correct?
A That's right.
Q Your declaration is as accurate and complete as you could reasonably make it, correct? 11:41:42
A Yes. There's a minor copy and paste problem that happened that I saw last night, but other than that, yes.
Q Okay. And where is that copy and paste error? 11:42:02
A It's on page 13. Claim terms. Part A is zone configuration and part B should be just group configuration. But initially I had them both together in one table and then I split it up. So B should be just group. That's it. 11:42:26
Q Is that the only error you see in your declaration?
A That's all I saw, yes.
Q So let's walk through your declaration. 11:42:42

Section 2, paragraphs 8 through 13, sets forth your qualification as an expert, correct?
A Yes.
Q And Section 3, paragraphs 14 to 22, sets forth your understanding of various legal standards related to claim construction; is that fair? 11:43:00
A That's correct.
Q In reaching your opinions set forth in your declaration, did you apply the legal standards set forth in Section 3? 11:43:16
A Yes. To the best of my ability, I did.
Q Okay. Section 4, paragraphs 23 to 29, sets forth your overview of the asserted patents, correct?
A Yes. 11:43:30
Q Subsection A -- in subsection A, you provide an overview of what you call the direct play patents, correct?
A Yes.
Q According to subsection A, the direct play patents share a common specification, correct? 11:43:50
A Yes.
Q At subsection B you provide an overview of what you call the zone scene patents, correct?
A Right. 11:44:14

Q According to this section, the zone scene patents include the '206, '966, and '855 patents, correct?
A Yes. I just want to point out these names were provided to me and I believe they were -- these are the Sonos designations. I'm not a hundred percent that's -- the groupings of the patents were provided this way. 11:44:31
Q When I -- if I refer to certain patents as direct play patents or zone scene patents, you understand what I mean by those terms? 11:44:46
A Yes.
Q Okay.
A I do.
Q According to subsection B, the '206 patent specification is substantially the same as the '966 and the '855 patent specifications, correct? 11:44:52
A Yes.
Q Okay. Moving on to section 5, paragraphs 30 to 34, those paragraphs set forth your opinions regarding the level of ordinary skill in the art, correct? 11:45:14
A Correct.
Q Then Section 6, paragraphs 35 and 36, sets forth your understanding of the asserted claims in 11:45:28

this matter, correct?
A Right.
Q Section 7, paragraphs 37 all the way through the end to paragraph 76, sets forth your analysis regarding some of the parties' disputed claim construction terms in this matter, correct? 11:45:48
A Yes.
Q And specifically paragraphs 37 to 48 provide your analysis regarding the terms "zone configuration" and "group configuration," correct? 11:46:02
A Correct.
Q Paragraphs 39 through 53 provide your analysis regarding the term "local area network," correct?
A 39? 11:46:18
Q Go ahead. Sorry. Let me repeat that.
Paragraphs 49 through 53 provide your analysis regarding the term "local area network," correct?
A Yes. 11:46:38
Q And paragraphs 54 to 59 provide your analysis regarding the term of "media particular playback system," correct?
A Yes.
Q Paragraph 60 to 73 provide your analysis 11:46:59

regarding the term "data network," correct?
A Correct.
Q And, lastly, paragraphs 74 to 76 provide your analysis regarding the term "wherein the instruction comprises the instruction," correct? 11:47:18
A Right.
Q So we just walked through your declaration here. Do you have any other changes besides that copy and paste error that you would like to make to your declaration? 11:47:33
A No.
Q So how about we jump to paragraph 24. It's on page 9 of your declaration.
A Okay.
Q Okay. Paragraph 4 -- paragraph 24 says: 11:47:54
"Each of the zone scene patents originated with U.S. provisional application number 60/825,407, which was filed on September 12, 2006."
Do you see that? 11:48:14
A Yes.
Q Now, let's take a look at paragraph 28 on the next page.
A I see it.
Q Actually, if you go to the bottom of page 11, 11:48:33

it says:
"In my experience, at the time the Zone Scene patents were filed, multi-zone audio systems existed from a variety of manufactures, such as Bose, Crestron, and others."
Do you see that?
A Yes.
Q Do you know any specific conventional multi-zone audio systems that existed at the time the zone scene patents were filed?
A Are you saying other than the ones I listed here?
Q Well, you've listed manufacturers, right? But do you know any actual product names or model numbers?
A Oh, product names. Let's see if I can recall any.
The Bose one I think was called a Lifestyle. I'd have to look it up.
Crestron -- Crestron makes hardware and software for multi-room installations, whether it's board rooms or homes. I don't know if they have a specific product name. But normally there's others. A lot of the home theater receiver manufacturers,

such as Denon -- I know that one because that was the first product that Audyssey went into when we first started. It was the AVR5805, and many others after that. They all provide connectors and mechanism to have multiple zones of audio in your home.
Initially there was two and eventually more than two, perhaps three or four. Yamaha, Marantz, Onkyo, many of those had those.
Q Have you ever used a Bose Lifestyle system?
A I have, yes.
Q Do you know -- do you know which Bose Lifestyle system you used?
A It's been so many years, so I don't remember the model number.
Q Does the Bose Lifestyle 50, does that ring a bell?
A Possibly, but I don't remember.
Again, this was one of the situations where we brought it into the testing lab at Audyssey just to look at things. So paid less attention to the model number than what it could do.
Q Do you recall how the Bose Lifestyle system operates?
A At a high level, sure, yes.

Q Could you please describe how the Bose Lifestyle system operates?
A It has the main -- I guess I would call it a processing box where you connect your audio sources. So it acts as a source selector. That box provides outputs that go to amplifiers in it as well and provides outputs that interconnect the loudspeakers. In that case I believe it was a 5.1 surround system. And it has an additional -- I don't know what they call it -- breakout box that allows you to extend to a different room and still be controlled by the main controller. And also it had a remote control.
Q How do the loudspeakers interconnecting to that central box communicate with the controller, the remote controller?
A The remote controller sends signals over a wireless link to the main box, I guess main processor. And then it tells, you know, what each speaker should be playing over the wired connections.
Q Do the loudspeakers connected to the central box communicate with one another?
A With one another? No. The central processor decides what to send to each one.
Q In the Bose Lifestyle system can you

synchronize the loudspeakers to play audio in synchrony?
A Yes.
Q How does the Bose Lifestyle accomplish that?
A That's a Bose method inside their own processor. Let's just say it wouldn't be a very successful product if they played out of synchrony. It would be a terrible audio system.
Q Right. But the loudspeakers don't communicate with each other, right? So how do they coordinate with one another to play audio in synchrony?
A Because the central processor that is deciding what to send, what signal stream to send to each one makes sure that they are transmitted over each connection in the required synchrony.
Q When you say "the central processor," you're talking about the central device that interconnects the loudspeakers, correct?
A Right. That has a processor in it and it's responsible for a number of things, simple things like adjusting volume in response to commands that it receives. Perhaps decoding audio formats from the sources that are coming in. And then distributing the audio over the interconnect.

Q So the loudspeakers communicate with the central processor, right, but they don't communicate with one another directly, correct?
MR. KAPLAN: Object to form.
THE WITNESS: The loudspeakers receive data from the central processor, but they don't communicate with each other. 11:55:35
BY MR. PAK:
Q Okay. So what -- what cables are required to interconnect the loud speakers to the central box or the central processor of the Bose Lifestyle system? 11:55:57
A These are provided by Bose. They are copper cables and they have RCA-type connections at the end of each side of the cable.
Q Do you know if the Bose Lifestyle system can communicate over Wi-Fi? 11:56:31
A I'm sure they have models that can. That particular one I don't think did.
Q So the loudspeakers are internet connected to the central processor or central box, right? What is the form of data that is transmitted between the loud speaker and the central processor? 11:56:59
MR. KAPLAN: Object to form.
THE WITNESS: It's analog audio data.
////

BY MR. PAK:
Q Does it have to be analog audio data?
MR. KAPLAN: Object to form.
THE WITNESS: In general or in that product?
BY MR. PAK:
Q In that product. In that product when a loudspeaker communicates to the central processor or the central box, does it send analog data or digital data?
A It sends analog data because the amplifiers are inside that same box where the processor is. So the output of the amplifier is using analog audio signals sent to each speaker. 11:57:42
Q So in that product, in that Bose Lifestyle system, the loudspeakers are not sending data packets to that central processor, correct? 11:57:59
MR. KAPLAN: Object to form.
BY MR. PAK:
Q Sorry. Did you say "correct"?
A Yes, correct. 11:58:17
Q Okay. Do you know if the Bose Lifestyle system communicated over a local area network?
A Communicated with what?
Q Do you know if the loudspeakers interconnected to the central processor could 11:58:38

communicate over a local area network?
A Based on what I said this morning, that is a local area network. It's analog data going to -- being carried over copper wires to end devices.
Q Okay. And this Bose Lifestyle system was unable to -- incapable of communicating over the internet; is that right? 11:59:06
MR. KAPLAN: Object to form.
THE WITNESS: Because I don't remember the model, I'm not sure if this -- if you could stream to it. It could connect to a number of sources. I just don't recall if one of them could be a wireless source. 11:59:35
BY MR. PAK:
Q Do you know when you used this Bose Lifestyle system? 11:59:52
A Probably seven or eight years ago.
Q So sometime in 2013, 2012 you used this Bose Lifestyle system?
MR. KAPLAN: Object to form. 12:00:13
THE WITNESS: To the best of my recollection.
BY MR. PAK:
Q Do you know when this Bose Lifestyle system was released?
MR. KAPLAN: Object to form. 12:00:23

THE WITNESS: I know that their Lifestyle series was released well before that. I just -- and they have more than one model. So that was probably current at the time when we looked at it, but I don't know. 12:00:42
BY MR. PAK:
Q But this is the model of Bose Lifestyle system that included a remote control, you said; is that right?
A Yes. 12:00:50
Q Could you describe what this remote control did in the Bose Lifestyle system?
A The obvious things. Selecting the source -- again, this is a bit of a long time ago, but I think it was change the volume and select the room. I think they call it multi-room in the manual or in the Bose language. So select which room you want the music to play in or if it was all rooms. 12:01:14
That's my basic recollection. There might have been other things too, but I just don't remember. 12:01:42
Q Do you know what the Bose Lifestyle system remote control looked like? Like what shape it might have been in?
MR. KAPLAN: Object to form. 12:02:01

THE WITNESS: It had a screen -- it had a screen in front of it. It might have been rectangular or oval. I'm stretching my memory.
BY MR. PAK:
Q I understand. I know it's 17 years ago. I was just curious. 12:02:21
I want to move to paragraph 31 of your declaration. It's talking about the level of ordinary skill in the art. Could you please read paragraph 31 of your declaration. 12:02:32
A Yes.
"In my opinion, a person of ordinary skill in the art at this time would have had a bachelor's of science in electrical engineering, computer science or engineering, or a related field, and two to four years of work or research experience in the field of information networks, data communications or multimedia systems, or a master's degree and one to two years of experience in the same field." 12:02:42 12:02:52
Q Does that mean a person of ordinary skill in the art can be someone with a master's degree in any 12:03:02

field and one to two years of experience in the fields of information networks, data communications, or multimedia systems?
A No. What I meant is a master's degree in the areas that I listed for the bachelor's. 12:03:19
Q Okay. So what you -- what you meant was a master's degree in electrical engineering, computer science, or engineering, and one to two years of experience in the fields of information networks, data communications, or multimedia systems; is that right? 12:03:34
A Correct.
Q Okay. So as it is written right now in paragraph 31, the way it's written is incorrect, right? 12:03:47
MR. KAPLAN: Object to form.
THE WITNESS: Well, I don't know if it's incorrect. I mean, I didn't want to repeat. I know that's probably customary in legal documents, but I thought it was obvious that it was referring to for bachelor's, you get your master's in the same fields. 12:04:02
BY MR. PAK:
Q And what are information networks?
A We've talked about all kinds of examples 12:04:14

today, but basically data networks. It's -- I guess in -- at least at USC, I think the -- it's an area that is studied called information networks. So I think it's just different terminology for data networks. 12:04:42
Q Are you using the term "information networks" to be synonymous with "data networks"?
A In this paragraph, yes.
Q So an information network is any type of media that carries data, right? 12:05:00
A Well, I don't know if it's -- like if you go to a network engineer and ask them what an information network is, that's the answer you would get. This is more of an academic field that I was referring to just because I know there are courses listed that way. 12:05:17
So I don't know if it's a physical thing. I was just referring to it as a field of study.
Q What does the field of data communications include? 12:05:33
A Protocols for communication for exchanging data. Error correction, anything to do with handling of data, analog or digital.
Q What are multimedia systems?
A Multimedia systems are generally considered 12:06:01

processing systems with processing that can handle multiple types of media, such as pictures, video, audio, voice, text, haptics, all the ones that we talked about earlier.
Q What about an audio system that only renders audio, is that a multimedia system? 12:06:38
A An audio system that can't handle anything else?
Q Yes.
A No. I would say no. Multi in multimedia requires more than one. 12:06:53
Q So if a person has a -- sorry, I didn't mean to cut you off.
A I'm fine. I'm done.
Q If a person has a bachelor's of science in electrical engineering and only has experience in audio systems that only render audio, but not any other type of media, then that person would not qualify as a person of ordinary skill in the art, correct? 12:07:06
A No, I don't agree. I think if somebody has studied multimedia systems as part of their field of study, they have also studied audio and other things. So if you have taken courses in multimedia systems, you certainly have taken courses in just 12:07:49

audio, similar to the ones that I teach, or just speech like my colleagues teach, or just video, and also the integration of them. So it comes with everything.

Q You know Sonos is a speaker company, right? 12:08:00

A Yes.

MR. KAPLAN: Object to form.

BY MR. PAK:

Q So if a person who works at Sonos has a bachelor's of science in electrical engineering and 12:08:14 has experience in working on speaker systems that render audio but don't render video or any other type of media, does that person still qualify as a person of ordinary skill in the art?

A That's kind of a hypothetical question. I'd 12:08:39 have to meet that person and find out what their experience was to really answer that. I don't know what courses they took or what experience they had prior to Sonos.

Q What I'm trying to get at here is the word 12:08:47 "multimedia systems." You know, it seems like in order to have experience in multimedia systems, right, you need to -- you need a person that studied a systems that render multiple types of media, according to your definition, right? 12:09:16

A Right. But not just renders. All aspects -- multimedia systems represent systems that deal with the integration, whether it's on the capture side, compression, streaming of these integrated media types. 12:09:47

But in order to study that, you do have to study each individual one as well. This is not just -- all components have to be studied individually as well. And I assume somebody with that kind of degree -- just based on the degrees we 12:10:00 have at USC, I can say that that's for sure the case.

Q What are -- what are some examples of multimedia?

MR. KAPLAN: Object to form. 12:10:15

BY MR. PAK:

Q Or let me phrase it differently.

What types of media -- what are some examples of media types that would be categorized as multimedia? 12:10:28

A Okay. So we're talking about media, not systems, right?

Q Yes.

A You know, some obvious ones are television programs, picture and sound, and graphics many 12:10:39

times. Computer games. More boring ones like PowerPoint presentations with audio or video embedded in them. Anything that has more than two media. Or two or more, I should say.

Q Is a multimedia system that can render two or 12:11:11 more types of media other than audio, would that qualify as a multimedia system?

A Sure.

Q So if a person has experience in implementing and designing multimedia systems that don't render 12:11:38 audio but other types of media, is it your opinion that that person would qualify as a person of ordinary skill in the art?

A I'm sorry. Could you repeat that one more time? 12:11:50

Q Yeah. So if a person has experience in implementing or designing a multimedia system that doesn't render audio but renders other types of media, is it your opinion that that person would qualify as a person of ordinary skill in the art? 12:12:04

A My assumption -- what I was trying to say here was that this person has studied multimedia systems. Whether they're designing now or not is different. But if they studied multimedia systems, then they certainly studied audio, voice, graphics 12:12:22

and text and others, perhaps, depending on the program. So they've certainly had experience.

Q Okay. So you're assuming that if a person has experience in multimedia systems, that person would have experience in other types of media, 12:12:43 whether that's video, audio, or images, that person would have experience in all of those different types of media, correct?

A Correct. I wouldn't call them "other." I would call them components of multimedia. 12:12:56

Q Okay. Let's take a look at paragraph 62 of your declaration.

A Yes.

Q Would you please read that paragraph for me, just the first two sentences. 12:13:28

A

"Numerous technical dictionaries confirm that data," in quotations, "including audio data, can be represented in both analog," in 12:13:37 quotes, "or digital," in quotes, "form. Digital data is," quotes, "data represented in discreet discontinuous form, as contrasted with analog data represented in continuous 12:13:47

form," end quote.
Q Okay. And then paragraph -- in paragraph 63, the second sentence, it says:
"In the generic sense, packets refer to the manner in which data are organized into discreet units for transmission and switching through a data network."
Do you see that?
A Yes. 12:14:12
Q So data packets are in digital form, correct?
A Data packets are, yes.
Q Can data packets be in analog form?
A Data can be in analog form, but it's not transmitted using packets. 12:14:37
Q Right. So data packets are not in analog form, correct?
A Correct.
Q Are there other discreet discontinuous forms of data that are not data packets? 12:14:53
A Yes.
Q What are those forms of data?
A A digital audio stream that consists of bits, those are not packets. It's continuous stream of bits or a digital audio stream that we talked about 12:15:17

before that has been modulated through some pre-agreed encoding scheme like pulse code modulation. Though those are not -- those are digital streams that are not packets.
Q In order to stream audio from the internet, 12:15:44 from an internet media source on a speaker, does that streaming audio have to be in the form of packets or can it be in a continuous form of data?
A If we're talking about the general purpose internet, you know, it only supports packet 12:16:32 protocols. So it would have to be put in that form.
Q I'd like to introduce a new exhibit here. I uploaded it and marked it as Exhibit 10.
(Exhibit 10 was marked for identification electronically and is attached hereto.) 12:16:55
BY MR. PAK:
Q Let me know when you see that.
A I see it.
Q Do you recognize this document?
A Yes. It's the '206 patent. 12:17:06
Q I want to take a look at Column 4. It's on PDF page 16 and line 36. It says:
"As used herein, unless explicitly stated otherwise, an audio source or audio sources are in digital 12:17:32

format and can be transported or streamed over a data network."
Do you see that?
A I do.
Q The '206 patent discusses sending and 12:17:43 receiving audio in digital form, correct?
A Yes.
MR. KAPLAN: Object to form.
BY MR. PAK:
Q Is there anywhere in the '206 patent that 12:17:52 discusses sending and receiving audio data in the form of -- let me -- let me rephrase that.
Is there anywhere in the '206 patent that discusses sending and receiving audio in analog form? 12:18:08
A That wasn't -- I'd have to go look at it again. I don't remember every word of the patent. The sections that I looked at for my opinion were -- you know, I just looked for those things. So I would have to go look and make sure of the answer. 12:18:26
Q Sitting here today, you can't recall any passages in the '206 patent that discusses sending and receiving audio data in analog form, correct?
MR. KAPLAN: Object to form. Mischaracterizes testimony. 12:18:43

THE WITNESS: Like I said, I don't want to say I do or I don't because I don't -- I'd have to go read it. It's possible.
For example, I know that at Sonos there are Sonos audio products that have analog inputs on the 12:18:55 back. And so I just don't know if -- I just don't know if there is a section in this patent since I haven't looked for that specifically.
BY MR. PAK:
Q Would it help if we take a few minutes for 12:19:17 you to review the patent and see if you can find any passages that discuss sending and receiving audio in the form of analog data?
A Sure.
Q Okay. So how about we do that, take a few 12:19:29 minutes.
A Okay.
THE REPORTER: Do you want to go off the record or not?
MR. KAPLAN: No. 12:19:46
THE WITNESS: By doing a quick search, I could find -- I could keep looking -- Column 4, line 65:
"The device 112 is configured to receive an analog audio source, e.g., 12:20:23

for broadcasting."
The audio sources -- Column 5 -- I'm just reading from line 65 onward. The last line there says:
"The analog audio sources can be converted to digital audio sources." 12:20:45
BY MR. PAK:
Q Right. And then the next sentence says:
"In accordance with the present invention, the audio source may be shared among the devices on network 108." 12:20:58
Do you see that?
A I do.
Q So let's go back to paragraph 4 -- column 4, line 50. Could you please read that paragraph for me. 12:21:07
A
"The network 108 may be a wired network, a wireless network, or a combination of both." 12:21:22
Q You can keep going.
A
"In one example, all devices, including the zone players 102, 104, 12:21:32

and 106, are coupled to the network by wireless means, based on an industry standard such as IEEE 802.11.
"Another example --
Q You can stop there. 12:21:47
As the patent describes, network 108 is talking about an internet-based network that uses industry standards such as the IEEE 802.11 standard, correct?
MR. KAPLAN: Objection. Mischaracterizes the document. 12:22:04
THE WITNESS: I don't -- I wouldn't call this internet based. This just tells me how the components are communicating, which is a wireless -- standard 802.11 wireless. 12:22:19
BY MR. PAK:
Q And the 802.11 standard requires data to be transmitted or received in digital format, correct?
A Correct.
Q And that data transmitted over 802.11 standard requires data to be transmitted and received in the form of data packets, correct? 12:22:33
A Correct.
Referring back to your analog question, I'm just seeing more sections here. Column 6, line 3 12:22:59

and 10. Without reading them directly, it talks about the ability to handle analog signals, whether it's processing them from inputs and then converting them to digital to share with other devices on a network. And then line 9 on the same column: 12:23:21
"The audio amplifier is typically an analog circuit, but powers the provided analog audio signals to drive one or more speakers."
Q So those sentences that you point out, you know, on Column 6 of the patent talk about processing analog signals, but when that signal is actually sent or received over the network, it talks about producing digital signals. So it's talking about converting the analog signals to digital signals to communicate over the network, correct? 12:23:43 12:23:56
A Yes.
MR. KAPLAN: Object to form.
THE WITNESS: Yes. I was just responding to your question as to whether there is any mention of analog in this. Clearly the patent talks about products that could handle connections to analog input signals. 12:24:06
BY MR. PAK:
Q Right. But does this patent talk about 12:24:17

sending analog data over the network, such as network 108 described in the patent?
A I think it does indirectly. Because in line 50 that you read before, the network may be a wired network. It doesn't say that that needs to be digital. It could be analog. 12:24:47
Q Well, you know, let's go back to Column 4, line 36. It says:
"As used herein, unless explicitly stated otherwise, when an audio source or audio sources are in digital format, they can be transported or streamed over a data network." 12:25:03
Right? So in line -- line 50 when it says "The network 108 may be a wired network or a wireless network, or a combination of both," it's talking about sending data in digital format, right? Unless it's stated otherwise, you have to assume that you're sending or receiving data in digital format, correct? 12:25:14 12:25:30
MR. KAPLAN: Objection. Mischaracterizes the document.
THE WITNESS: I don't know. It's hard -- it's like the paragraph here, maybe. I'm not 12:25:45

certain about that.
BY MR. PAK:
Q Sure. Let me ask you this way.
So in line 50 in Column 4, it says:
"The network 108 may be a wired network or a wireless network or a combination of both." 12:25:55
Right?
A Yes.
Q Does that sentence mention analog? 12:26:02
A No.
Q Okay. Let's take a look at paragraph 64 of your declaration. So back to Exhibit 9. It's PDF page -- PDF page 23.
And in the middle of that paragraph, it says: 12:26:43
"These networks allowed cellular devices to send and receive data, as Sonos requires, typically in the form of voice calls."
Do you see that? 12:26:56
A Yes.
MR. KAPLAN: I'm sorry. Which paragraph again?
MR. PAK: Paragraph 64.
MR. KAPLAN: Thank you. 12:27:08

switch telephone network and send audio data to render that audio data on one of those speakers?
A Oh, yeah, absolutely. Speaker phones, right?
Q Do the patents disclose speaker phones?
A I was just giving you an example of what you could connect. You can connect any kind of transducer because what you're getting out is an audio signal. So if you send it to a loudspeaker, it will play, and the loudspeaker can be any kind of form. 12:29:08 12:29:29
Q Does the '206 patent discuss sending or receiving data over a public switch telephone network?
A Well, as I say, it talks about sending and receiving it over networks in general and it doesn't exclude that, but it doesn't mention it specifically either. 12:29:42
Q Is a speaker phone capable of processing and rendering audio data?
A Yes. 12:30:03
Q Does the '206 patent discuss sending or receiving audio data via RCA cables?
A The discussion we had before about connecting analog sources, and I do know that some of the Sonos speakers have that in the back, but that connection 12:30:30

THE WITNESS: I see it.
BY MR. PAK:
Q Does the '206 patent discuss sending or receiving audio data over a cellular or voice network? 12:27:19
A Well, it discusses sending or receiving it over wireless networks. So that would cover all kinds of wireless networks in the broadest sense, right? It doesn't exclude them.
Q Can you send data over a voice network to render audio on a device? 12:27:41
A So because you don't have construction of what a voice network is, claim construction around voice network, I want to know what your definition is of voice network so I can answer correctly. 12:28:14
Q Right. So earlier you said a voice network would be -- like an example would be a telephony network, like a public switch telephone network, correct?
A Correct. 12:28:28
Q And you wouldn't send or receive audio data over a public switch telephone network, would you?
A Why not? Voice is audio data basically, right? So you kind of are doing that.
Q Can you have speakers connected to a public 12:28:44

would typically be an RCA cable. It might also be a mini jack, a 1/8th inch jack or cable.
Q Okay. So let's look at the patent, Column 1, line 40. Would you please read that first sentence for me. 12:31:15
A
"Currently one of the systems that can meet part of such demand is a conventional multizone audio system that usually includes a number of audio players." 12:31:21
Q Keep going.
A
"Each of the audio players has its own amplifiers and a set of speakers and typically installed in one place, e.g., the room. In order to play an audio source at one location, the audio source must be provided locally or from a centralized location." 12:31:28 12:31:41
Keep going?
Q No, that's okay.
Is there anything in this patent that distinguishes those type of conventional multi-audio 12:32:07

systems to what is disclosed in the patent as the invention?
MR. KAPLAN: Objection to form.
BY MR. PAK:
Q Let me put it this way. The next paragraph, can you read the first sentence of that -- of line 56.
A
"In order to achieve playing different audio sources in different audio players, the traditional multizone audio system is generally either hard wired or controlled by a preconfigured and preprogrammed controller." 12:32:34 12:32:44 12:32:55
Q Right. So the patent talks about traditional multizone audio systems being either hardwired or controlled by a preconfigured or preprogrammed controller, and it distinguishes those traditional multizone audio systems from the -- from the system disclosed in the '206 patent as the invention, right?
MR. KAPLAN: Object to the form.
THE WITNESS: I mean, that's kind of the purpose of writing the background. What you're 12:33:13 12:33:49

going to say after that is supposed to be better.
BY MR. PAK:
Q Right. So the disclosed system in the '206 patent that's described as the invention isn't talking about these hardwired traditional multi-zone audio systems, right? 12:34:07
MR. KAPLAN: Object to form.
THE WITNESS: Well, it doesn't completely go away from it because it allows for a wired source, an analog wired source to be connected to one of the zone players and then be distributed. So it doesn't completely remove them. 12:34:31
BY MR. PAK:
Q Does the patent discuss what the wired source has to be, what form it has to be in? 12:34:49
MR. KAPLAN: Object to form.
THE WITNESS: It gives examples at the bottom of Column 4, line 66, broadcasting, which is analog, compact disk, which could be digital or analog, depending on what connection you have. Yeah, those are examples. 12:35:20
BY MR. PAK:
Q All right. So let's take a look at Column 5. And I'm looking at line 33. It says:
"The wired interface 217 provides 12:35:39

network interface functions by a wired means, for example, an Ethernet cable."
Do you see that?
A Yes. 12:35:46
Q So the patent discloses that the wired network can be an Ethernet cable, right?
A That's a different network than the one that connects -- this is not for connecting sources. This is for connecting speakers together to -- could be wired or wireless. The previous discussion was about what kind of sources. 12:36:07
Q Right. So this is talking about the wired interface of a zone player, correct?
MR. KAPLAN: Object to form. 12:36:36
THE WITNESS: Yes. This is talking about how to connect multiple zone players, in this case, speakers, whether they're wired or wireless. They provide capability for both.
BY MR. PAK: 12:36:54
Q So let's talk about the zone player. So the zone player has network interface -- so a zone player has a network interface 202, which may include one or both of the wireless interface 216 and a wired interface 217, right? 12:37:17

A Yes.
Q Okay. And specifically the wired interface 217 provides network interface function by wired means, for example, an Ethernet cable, correct?
A Correct. And this is why I was talking about the introduction before. It seems to contradict the benefit because they say that the old systems were all wired and so they're no good. But now they also provide capability for wired. So it's just a different type of wire, I suppose. 12:37:39 12:37:55
Q As you recall, did these traditional multizone audio systems include speakers that were connected via an Ethernet cable?
A No. That's what I'm saying. They were connected by copper RCA cables or speaker cables directly. 12:38:16
So this is a different kind of cable, but still the possibility existed of speakers in different zones or rooms that are connected by wires. Just a different kind of wire. 12:38:31
Q What is the difference between an Ethernet cable and a copper wire such as an RCA cable?
A I guess Ethernet cables are also made of copper, but they have different kinds of endings and they have multiple strands in them carrying data. 12:39:06

So I guess I would consider an Ethernet cable capable of carrying digital packet data, whereas an audio interconnect carries analog audio data.
Q So an RCA cable carries analog data, whereas an Ethernet cable carries digital data packets, 12:39:38
correct?
A To be totally clear, analog cables -- sorry, RCA cables can also carry digital data. Just not packetized.
Q Okay, that makes sense. 12:39:54
I want to take a look at paragraph 66 of your declaration.
A Yes.
Q Let me get to it real quick. The second sentence of paragraph 66 says: 12:40:21
"There are many types of networks that do not require a network device to both send and receive data from another device. For example, networks may be configured in a ring such that 12:40:31
no device both sends and receives data directly to and from another device."
Do you see that?
A Yes.
Q Okay. So let's take a look at Sonos's 12:40:43

proposed construction on page 21 of your declaration. Could you please read Sonos's construction for data network.
A
"A medium that interconnects the 12:41:00
devices enabling them to send data packets to" --
I'll start over.
"A medium that interconnects devices, enabling them to send digital 12:41:09
data packets to and receive digital data packets from each other."
Q Does Sonos's proposed construction of data network require sending and receiving data directly to and from another device? 12:41:26
MR. KAPLAN: Object to form.
THE WITNESS: I guess I'm not sure what "directly" means in this context. We're connecting two devices.
BY MR. PAK: 12:41:45
Q So let me ask you this way. Does the word "directly" appear in Sonos's proposed construction?
A It does not.
Q Okay. So Sonos's construction of data network does not require sending and receiving data 12:41:56

directly to and from another device, correct?
MR. KAPLAN: Object to form.
THE WITNESS: I don't know how else to interpret this. It says, "sending and receiving from each other." So unless there is something in 12:42:10
between that is not disclosed, what else could it be, right?
BY MR. PAK:
Q Right. So Sonos's construction of the data network is broad enough to cover directly or 12:42:19
indirectly sending and receiving data, correct?
MR. KAPLAN: Object to form.
THE WITNESS: Right, that's true. But my construction, though, was not really focused around the directly part. It was that a data network, as 12:42:43
we've already discussed since this morning, doesn't have to be digital packets.
BY MR. PAK:
Q Right. But let's look at paragraph 66 again. And it says: 12:43:00
"For example, networks may be configured in a ring such that no device both sends and receives data directly to and from another device."
Right? But Sonos's construction doesn't say 12:43:11

or doesn't require direct -- directly sending and receiving data, right?
MR. KAPLAN: Object to form.
THE WITNESS: The intent of this sentence that I wrote here was that "directly" is kind of a 12:43:38
substitution for each other. Because obviously in a network, in a ring network, devices are sending data and they're receiving data. But it's not a send and receive between two devices. And that's what I meant by "directly" here. I didn't imply there was 12:43:54
nothing in between.
BY MR. PAK:
Q So -- sorry.
A No, no.
Q So in that -- so if a network is configured 12:44:03
in a ring, you'd agree with me that a device can both send and receive data to and from each other?
A No. Because to and from each other means you have two devices and they're talking back and forth. And in a ring network, one device will send to the 12:44:27
next. If it has the token, it will -- let's say it's clockwise orientation and it will send to the next one and receive from the one before it. So it's sending and receiving two different devices, not a two-way communication. 12:44:50

Q What is a token ring network?
A It's a set of devices connected in a network that is -- as I described, think of a circle with multiple points in it. Each of those is a network device. The protocol is such that to avoid what 12:45:12
network people call collisions, which is when a bunch of data tries to arrive at the same time, to avoid that they use traffic police kind of system where you can't talk unless you've been told to talk because you have the token. And so data goes around 12:45:36
in circles. It can be clockwise. It can be counterclockwise. And sometimes it's a star configuration where there's a -- literally a central node and everybody communicates through, or sometimes it's a controller. So it's a different 12:45:51
configuration for a network topology.
Q I'd like to introduce a new exhibit here. I uploaded a new exhibit marked as Exhibit 11.
Do you see that?
A Yes. I'm waiting for it to open. I see it. 12:46:21
(Exhibit 11 was marked for identification electronically and is attached hereto.)
BY MR. PAK:
Q Do you recognize this document?
A Yes. 12:46:33

A Yes.
Q Let's look at the top right PC. So this top right PC can receive data from one of these PCs, correct?
A Assuming that the token protocols were 12:48:32
followed, yes.
Q From what devices can this PC receive data from?
A From whichever device decided to address the token to that PC. 12:48:56
Q So it can be any one of the four other devices on this token ring network, correct?
A It can, although you'll have to -- if it's the one next to or below to the right, it would have to wait a while until it gets there because it has 12:49:19
to go through all the other ones. But yes.
Q So can that PC on the top right transmit data to any of the four other PCs in the token ring network?
A Again, yes, if it decides it wants to 12:49:36
transmit to one of them and puts that information on the token and addresses it to that PC, yes, it can do that.
Q Okay. And I want to go back to your declaration now, looking at paragraph 67. On page 12:49:53

Q This was attached as Appendix L to Dr. Schmidt's declaration, and you reviewed this document, right?
A I did, yes.
Q I want to take a look at the last page, PDF 12:46:42
page 6.
Do you see the token ring network configuration at the bottom left?
A I see it.
Q So in this token ring network configuration, 12:46:56
can a given device send data to or receive data from another device?
A Yes, but not from the same device in both directions.
Q Okay. And in the last sentence below that 12:47:17
configuration, it says:
"Any PC can grab a passing token and attach data and the address of another PC to it, as each PC in turn watches for tokens that are addressed 12:47:41
to it."
Right?
A Yes.
Q So you're saying in this configuration -- let's pick one example. There's five PCs, right? 12:48:10

24.
A Yes.
Q It says:
"Various publications also confirm that unidirectional data 12:50:08
networks were well known in the art."
And you relied on U.S. patent No. 6,081,907.
Do you see that?
A I do. 12:50:19
Q And you would have to go to the electronic exhibit, because I want to look at PDF page 157.
A Okay. That was Exhibit 9?
Q Yes, correct.
MR. KAPLAN: Which PDF page? 12:50:51
MR. PAK: PDF page 157.
THE WITNESS: I'm looking for an easier way besides scrolling.
MR. KAPLAN: I don't know that there is.
THE WITNESS: I'm almost there. Okay. 12:51:30
Wait. I'm sorry. Are we talking about the monthly unique users graph?
BY MR. PAK:
Q No. Hold on one second. I'm putting it in the chat right here. 12:51:56

MR. KAPLAN: 157 for me is the '907 patent.
THE WITNESS: Oh, I had 57. Okay.
BY MR. PAK:
Q There's a little scroll controls you can --
A Yeah. 12:52:13
Q Yeah.
A Okay. I see it.
Q Okay. And this is a copy of the '907 patent provided as an exhibit to your declaration, right?
A Yes. 12:52:36
Q Okay. And I want to go down to PDF page 165. And I want to focus on the background section of the '907 patent.
A Okay.
Q Okay. And the first paragraph of the 12:52:58 background section says:
"Conventional computer networks are bidirectional, allowing data communication in both directions between servers and clients. 12:53:08 Transmitting data over these bidirectional data networks has been a mainstay of computer technology for many years and the communication protocols are well established." 12:53:20

BY MR. PAK:
Q Okay. Let's take a look at Column 3, the second paragraph. It says:
"The bidirectional data network 28 represents various types of 12:54:33 networks, including the internet, a LAN, local area network, a WAN, wide area network, and the like."
Do you see that?
A I do. 12:54:46
Q In the next paragraph it says:
"The broadcast center 26 receives the data served from the content servers 22(l) through 22(K) over the network 28, and broadcasts the data 12:55:02 over a broadcast network 30 to the clients 24(l) through 24(M)."
Do you see that?
A I do.
Q Now, if you look at Figure 1 of the '907 12:55:15 patent, and it's PDF page 158, you see there's a separate bidirectional data network 28 and a broadcast network 30, right?
A 28 and 30, yes, I see it.
Q So you'd agree with me that the bidirectional 12:55:45

Do you see that?
A Yes.
Q All right. And the third paragraph in the background section, could you actually read that paragraph for me. 12:53:31
A
"Apart from the classic bidirectional data networks, there is an increasing interest in the use of broadcast or multicast networks to 12:53:40 deliver computer data and other content to clients. These types of distribution networks are unidirectional in that data flows from the server to the clients, but no 12:53:50 return communication is possible over the same communication path."
More?
Q That's okay.
So the '907 patent actually distinguishes the 12:54:03 classic bidirectional data network from a unidirectional broadcast or multicast network, correct?
A Yes.
MR. KAPLAN: Object to form. 12:54:17

data network 28 and broadcast network 30 in the '907 patent are different networks, right?
MR. KAPLAN: Object to form.
THE WITNESS: That's what is shown in this diagram. They're showing an example that has both 12:56:11 in there.
BY MR. PAK:
Q As shown in Figure 1, you'd agree that data network 28 is bidirectional, whereas the broadcast network 30 is unidirectional, correct? 12:56:24
A Yes, that's what is being disclosed.
Q Is there anywhere in the '907 patent that mentions that broadcast network 30 is a data network?
MR. KAPLAN: Object to form. 12:56:43
BY MR. PAK:
Q And we can take a minute if you need a minute to review the patent.
A Yeah, let me take a minute.
So Column 3, line -- the paragraph that 12:57:30 starts at line 33, it says:
"The broadcast network 30 can be implemented in a variety of ways. For instance, the broadcast network might be implemented as a wireless network 12:57:55

configured for one-way transmission, i.e., satellite, radio, microwave et cetera. The broadcast network might also be a network that supports two-way communication, but is predominantly used for unidirectional multicasting from the broadcast center to many clients simultaneously." 12:58:08

Q So in that sentence, does the patent use the word "data network"? 12:58:29

A Well, as we've said before several times, wireless networks that transmit data are data networks. And so it doesn't say data network when it talks about ATM or Ethernet or anything else. These are all data networks. 12:58:54

Q Why does the patent use the term "data network" when it describes data network 28, but doesn't use the term "data network" when it talks about broadcast network 30?

MR. KAPLAN: Object to form. 12:59:09

THE WITNESS: I don't know what they had in mind in their language to write it that way, but -- I don't know. I can't answer why they said it that way.

////

BY MR. PAK:

Q Let's look at Column 4 of the '907 patent. If you look at line 22 --

A Yes.

Q It says: 12:59:45

"The packet encoder 52 encapsulates packets of data with appropriate headers for transmission over the data network and broadcast network." 12:59:57

Do you see that?

A Yes.

Q So this patent discloses that the bidirectional data network 28 and the broadcast network 30 both transmit data in the form of data packets, right? 01:00:12

A I can indirectly assume that based on this sentence.

Q Do you see any disclosure in the '907 patent where data that is transmitted over the data network or the broadcast network is not in the form of data packets? 01:00:33

MR. KAPLAN: If you need to review the patent, you can.

BY MR. PAK:

Q Sure. Take a minute if you need a minute to review.

A I think it goes back to Column 3, the paragraph that I was reading before, line 33 -- actually, line 36 where it gives examples. 01:00:59 Satellite, radio, and microwave. What we talked about before, satellite may or may not be data. But radio and microwave is -- may not be data packet, but radio and microwave are most likely not packet based. So it's certainly possible the way they wrote it. 01:01:25

BY MR. PAK:

Q Let's take a look at the figures here. And I want to take a look at Figure 4. Let me see if I can find the description for it. 01:01:58

Actually, let's take a look at Column 5, line 35. The paragraph says:

"Figure 4 shows exemplary steps in a method for serving data packets over the unidirectional network." 01:02:21

Do you see that?

A Yes.

Q So Figure 4 is describing a method specific to transmitting data packets over broadcast network 30, right? 01:02:35

MR. KAPLAN: Object to form.

THE WITNESS: It's describing a method, but not all the methods, right? Because we talked about other possibilities. In this paragraph it's a method, yes. 01:02:47

BY MR. PAK:

Q And then Column 6, line 15, it says:

"Figure 5 shows the byte-wise technique for generating a redundancy packet from multiple data packets within a redundancy group." 01:03:25

Do you see that?

A I'm sorry. I heard it, but I missed which paragraph we're in.

Q Column 6, line 15. 01:03:37

A Yes, I see it.

Q So Column 5 again is describing a certain technique for generating packets, right? Data packets?

MR. KAPLAN: Object to form. 01:03:54

Do you mean Figure 5?

BY MR. PAK:

Q Yeah, I'm sorry. Let me rephrase.

Figure 5 is illustrating a specific technique for generating data in the form of data packets, 01:04:09

right?
A In this paragraph it's talking about a specific aspect of it, aspect of the redundancy formatter, I think is what they're talking about here. 01:04:35
Q Right. But, generally speaking, Figure 5 is talking about data packets, correct? It's talking about data in the form of data packets.
MR. KAPLAN: Object to form.
THE WITNESS: It is. I'm just looking a little further down where it says it's illustrative for example purposes. "Other computations may be used" -- this is line 30 of the same column. 01:04:50
So there are examples that involve packets, I agree with that. But they're also saying there are other ways. 01:05:20
BY MR. PAK:
Q Okay. And then Column 7, second paragraph, it says:
"Figure 6 shows an exemplary data structure 110 for data packet formed by packet encoder 52 and redundancy formatter 54." 01:05:31
Do you see that?
A I see it. 01:05:42

Q So we have Figure 4 is also talking about data packets, right?
A Figure 6, you mean?
Q I'm sorry. So Figure 6 is also talking about data packets, right? 01:06:02
A Yes, it is. It's showing the structure. If you have data packets, this is what they should look like.
Q And the top of column 8, it says:
"Figure 7 shows exemplary steps in a method for receiving data packets transmitted over a unidirectional network." 01:06:12
Do you see that?
A Yes. 01:06:20
Q So Figure 7 is talking about data packets, correct?
A Yes.
Q So are there any figures in the '907 patent -- in the '907 patent that doesn't talk about data packets? 01:06:32
MR. KAPLAN: Object to form.
THE WITNESS: My reference to this patent was not to address the data packet or not issue. It was to address unidirectional and bidirectional and 01:06:55

possible coexistence.
So, no, I don't see any figure -- the figures are focusing on byte patterns and headers and packet related stuff. But, again, this was not my purpose for quoting this patent. 01:07:24
MR. PAK: Okay. I want to transition away from discussing data networks and talk about some of the other terms in your declaration. Do you want to take another break or just power through it?
Why don't we take a break and come back in ten minutes. Is that okay? 01:07:47
THE VIDEOGRAPHER: Does anybody need more time than that?
We can go off the record. We're off the record at 1:07 p.m. 01:07:55
(Lunch recess.)
THE VIDEOGRAPHER: We are on the record at 1:43 p.m.
BY MR. PAK:
Q So far we talked about various examples of data networks and local area networks. And I just want to run by one more example with you to further understand what local area network means to a person of ordinary skill in the art. 01:43:32
So the question here is, if -- if someone 01:43:49

used two cups on a string to communicate with another person, does that amount to communicating over a local area network?
A I thought we covered this in the morning.
Q Yeah, we -- 01:44:01
A I think we talked about it --
Q Yeah, in the context of data network, but we haven't talked about it in the context of a local area network.
A I mean, honestly, don't take it personally. 01:44:10
It's a little bit of a silly example, over a string, but I guess if we -- if we use the definition that a person would use for networks, this is taking acoustic data and converting it to mechanical form and then -- to transmit, and then converting it back 01:44:40
to acoustical at the other end. So in that sense, it is a data network.
The criteria I use for whether it's a local area network is you have to have something to compare it to. So stretching the string out to a 01:45:00
much larger area would produce a wider area string network, and this would be a local area network. So I think all those definitions are consistent.
Q So communicating using a string, two cups on a string, would amount to a local area network in 01:45:28

your opinion?
MR. KAPLAN: Objection. Mischaracterizes testimony. Asked and answered.
THE WITNESS: Local -- the word "local" only makes sense if there's something else to compare it to that is bigger or smaller. 01:45:43
And so, as I say, if there's a larger distance with bigger string, that would be a wide area network on a string and then this would be called local if it was a smaller one. But by itself, it's hard to say because you need a comparison. 01:45:58
BY MR. PAK:
Q Right. So depending on the length of the string that connects the two cups, right, someone that uses two cups on a string to communicate with another person, that would amount to communicating over a local area network, correct? 01:46:08
MR. KAPLAN: Same objections.
THE WITNESS: Well, I guess same answer. It depends. There's no -- there's no length of the string that would be -- there's no size of the -- of an actual LAN that we can say if you go past this, you're no longer local area. It's -- as we saw, LANs cover from a building to a hotel to a campus to 01:46:24 01:46:44

a wide area complex.
Same for this. It's a local area network compared to something that is a longer distance, for example, but I can't give you a number.
BY MR. PAK: 01:47:03
Q Sure. But if the string is -- so you're saying that depending on the length of the string, communicating using two cups attached to that string can either be a local area network or a wide area network then, correct? 01:47:18
A Yeah, sure.
Q Okay. So I want to go on to talk about the media particular playback system term. And if you take a look at paragraph 58 of your declaration. So we're going back to Exhibit 9. 01:47:39
A Yes.
Q Would you please read paragraph 58 for the record.
A Yes.
"I disagree with Dr. Schmidt that a POSITA would understand the media particular playback system of Claims 3, 15 or 26 to mean media playback system. I have reviewed the prosecution history, but find that it 01:47:51 01:48:04

does not resolve the debate relating to the use of the term 'particular.'"
Q Okay. So I want to take a look at the prosecution history of the 615 patent. And just give me a minute to introduce the exhibit. 01:48:18
Okay. So I've just uploaded here an exhibit marked as Exhibit 12.
Do you see that?
A Yes.
(Exhibit 12 was marked for identification electronically and is attached hereto.)
BY MR. PAK:
Q Do you recognize this document?
A Yes.
Q Okay. So this is Appendix N of Dr. Schmidt's declaration, right? 01:48:56
A Yes.
Q You know, before we get into his response, you know, just generally speaking, why do you think an applicant would amend its claims during prosecution? 01:49:14
MR. KAPLAN: Object to form.
THE WITNESS: This sounds like a legal question to me.
I don't know. Because of an error, because 01:49:40

of additional facts, a response to the examiner. Those are some reasons I can think of.
BY MR. PAK:
Q Can you think of any other reasons why an applicant would amend its claims during prosecution? 01:49:57
MR. KAPLAN: Object to form.
THE WITNESS: No.
BY MR. PAK:
Q Well, look at this office action response. Do you think the applicant here amended its claims to overcome the cited references? 01:50:21
A It's hard for me to speak on behalf of the applicant, the reasons that they had. I can only speak as to, you know, what I see written here. Is there a specific section you want me to look at? 01:50:51
Q Yeah, so how about we take a look at the remarks on PDF page 15.
A Okay.
Q All right. Again, the summary of the office action, it says: 01:51:10
"In the non-final office action mailed July 15, 2016, the examiner rejected Claims 1, 6 through 10, 15 through 19, and 21 through 29 under 01:51:22

pre-AIA 35 U.S.C. Section 1038, as being allegedly unpatentable over DaCosta in view of Dua."
Do you see that?
A I see it. 01:51:39
Q And there are some other, you know, 103 rejections with respect to Claims 3, 12 and 20, correct?
A Yes.
Q Okay. And then looking at Section 3, the 01:51:46 response to the 103 rejections, the second sentence says:
"For at least the reason that cited references do not teach the subject matter currently recited by 01:52:11 applicant's claims, the pending 103 rejections should be withdrawn."
Do you see that?
A I see it.
Q Okay. And let's take a look at Claim 1 on 01:52:21 PDF page -- PDF page 3.
Do you see that the applicant amended Claim 1, right?
A Is this the paragraph numbered 2?
Q I'm taking -- I'm looking at the amendments 01:52:53

to the claims on PDF page 3.
A Oh, sorry, 3.
I see it, yes.
Q Do you think the applicant here amended Claim 1 to overcome the cited references? 01:53:05
A So I probably looked through the cited references, but I don't have them at the tip of my tongue at the moment to be able to answer that accurately.
Q Okay. Did you review any of the cited 01:53:26 references?
A I read through them. I wouldn't say that I reviewed them in the same way that I reviewed the patents.
Q Okay. So, again, I want to -- how about I 01:53:41 introduce one of the cited references and discuss that. Just give me a minute.
I just uploaded an exhibit and marked it as Exhibit 13.
Do you see that? 01:54:24
A Yes.
(Exhibit 13 was marked for identification electronically and is attached hereto.)
BY MR. PAK:
Q Do you recognize this document? 01:54:35

A I do.
Q Okay. And this is one of the patent publications that was cited in the non-final office action mailed July 25th, 2016. Correct?
A Yes. 01:55:06
Q Okay. And you reviewed this reference, right?
A As I said, I read through it but mostly looked at the comments. So I didn't review it in the same way that I would review an actual patent in 01:55:21 this case, but I -- I'm familiar with it.
Q Sure, that's fair.
I want to take a look at paragraph 57, so on PDF page 24. Would you please read the second sentence in paragraph 57. 01:55:47
A The second sentence?
Q Yes.
A Okay.
"The term 'media player' generally refers to electronic devices 01:56:04 that are capable of processing media such as audio, video, images, presentations, animation, and internet content, for example, cellular phones, personal digital assistants (PDAs), 01:56:17

music players, game players, video players, cameras and the like."
Q Okay. And I want to skip to paragraph 142 now. It's on PDF page 32.
A Yes. 01:56:41
Q Would you please read that first sentence on paragraph 142.
A Yes.
"Finally, the device's media processing capabilities 461 are listed 01:56:47 in the RFID transmission data 450. This is" --
Q Actually, please keep going. Read the second sentence.
A 01:56:58
"This information indicates the device's ability to process media assets that are in specific formats."
Q Okay. And the patent further discusses some example media formats, correct? 01:57:11
A Correct.
MR. KAPLAN: Object to form.
THE WITNESS: It does.
BY MR. PAK:
Q And looking at paragraph 143, could you 01:57:18

please read the first sentence.
A
"This type of information allows media player 100 to only transmit media assets which are supported by the target devices." 01:57:28
Q Would you please read the second sentence in full.
A Oh, sure.
"This information also allows either or both of the target device and media player 100 to convert media assets into supported formats before transmission to the other when required." 01:57:38 01:57:59
Q Okay. So based on, you know, these -- this disclosure that we -- that I just had you read, do you agree that Dua disclosed a media player that can play particular media formats?
A Yes. 01:58:20
Q Do you agree that Dua disclosed a media player that can play particular types of media?
A They disclosed a --
MR. KAPLAN: Object to form.
THE WITNESS: They disclosed a -- the ability 01:58:33

to play back multiple different types of media.
I think that's what you're asking, yes?
BY MR. PAK:
Q Right. So just to clarify, so does -- do you agree Dua discloses a media player that can play particular types of media? 01:58:48
MR. KAPLAN: Object to form.
THE WITNESS: I guess I'm trying to understand how you're using the word "particular" here. 01:59:13
It's -- they list a number of media by example, but it's not clear to me that they're excluding others. So I'm not sure how to answer that.
BY MR. PAK: 01:59:27
Q Yeah, so let me reword this.
Does Dua disclose a media player that can play audio?
A Yes.
Q Does Dua disclose a media player that can play video? 01:59:39
A Yes.
Q So Dua discloses a media player that can play any particular type of media, right?
MR. KAPLAN: Object to the form. 01:59:55

THE WITNESS: Well, under audio, they list specific formats for that audio, but not all possible. So I think "any" might be too broad because they don't list -- it's hard to say.
BY MR. PAK: 02:00:11
Q All right. But Dua discloses a media player that can play different types of multimedia, right?
A Right, different types of audio, different types of video, and graphics.
Q Okay. So now let's go back to the office action response, Exhibit 12. 02:00:32
And I want to take a look at Claim 3. And it's on PDF page 4.
Do you see that?
A Yes. 02:00:59
Q What amendments did the applicant make to Claim 3?
MR. KAPLAN: Object to form.
THE WITNESS: I'm sorry, Claim 3, PDF page 4 starts -- is a half paragraph. No, no, sorry. 02:01:15
BY MR. PAK:
Q Yeah, so Claim 3, you know, starts from PDF page 4 and ends at PDF page 5, right?
A Yes.
Q Okay. So what -- so looking at the 02:01:33

amendments to Claim 3, could you please walk through all the amendments the applicant made in this office action response.
MR. KAPLAN: Objection. The document speaks for itself. 02:01:50
THE WITNESS: I assume it's the underlined words of the amendment.
BY MR. PAK:
Q Yeah. So, you know, I'm not trying to trick you here. So the underlined -- the underlined words represent words that were added. 02:01:59
A Okay.
Q And the strike -- and the strike through represents terms, phrases that were deleted.
So I really just want, you know, to go over all the amendments. You know, can you walk through what amendments were made. 02:02:14
A Sure. So they added the word "particular" in several places. "Particular playback device." "Media particular playback system." 02:02:36
And then "wherein the first zone includes the particular playback device."
So all the additions have to do with "particular" except for the last one that they added, "playing back multimedia content in 02:02:55

synchrony."
And then they removed "initiating playback" in two locations.
Q Okay. So looking at the amendments to Claim 3, do you agree that the applicant added the word "particular" in front of the word "playback" throughout Claim 3? 02:03:13
A Yes, except for one location, second to the last line.
MR. KAPLAN: Object to form. 02:03:34
THE WITNESS: Actually in a couple places. It's not every "playback" that has "particular." It's selective. The word "particular" was not added in front of every time "playback" appears. Only some. 02:03:53
BY MR. PAK:
Q Well, the word "particular" was -- all right, I see.
So where it says "at least one additional playback device," you're saying it doesn't say "at least one additional particular playback device." 02:04:02
Is that right?
A Oh, that wasn't the only -- the second to last line of the previous page, where it says "control playback by the playback device," they did 02:04:22

not add the word "particular" there.
Q Is "media playback system" a broader term than "media particular playback system"?
A That's --
MR. KAPLAN: Object to form. 02:04:41
THE WITNESS: That's the part that was difficult to ascertain. So that is one way to interpret that, that it plays back only particular media.
The other one is that there's all kinds of playback systems, and I provided an example. It plays -- records and plays back other kind of data that is not media. And this would be particular to media. 02:04:56
So it can be particular to all kinds of media, particular to one media, or a typographical error, as was indicated by Sonos. I couldn't tell which of those three -- and there may be others. And that was the reason for my opinion. 02:05:08
BY MR. PAK: 02:05:26
Q Sure. So before Claim 3 was amended in this office action response, do you think Claim 3 was indefinite?
So, you know, let me ask it this way. Do you think Claim 3 was indefinite before the applicant 02:05:42

amended "media playback system" to "media particular playback system"?
MR. KAPLAN: Object to form. Scope.
THE WITNESS: So are you asking if I had read this without the word "particular" in the amendment, would I still have the same opinion? Is that -- 02:06:05
BY MR. PAK:
Q Yeah. So, you know, before this claim was amended, right, you know, it used the term "media playback system" instead of "media particular playback system," right? 02:06:19
A Right.
Q So before Claim 3 was amended to use -- amended to use "media particular playback system," would a person of ordinary skill in the art understand Claim 3? That's what I'm trying to ask. 02:06:35
A Right. Probably. Although I'm kind of reforming an opinion by just quickly reading through this paragraph, but I'm just reading it as if the word "particular" isn't there, and it would just be "media playback," right? 02:07:13
Q Right. So if you substituted the "particular playback system" back to "media playback system," a person of ordinary skill in the art would understand Claim 3, correct? 02:07:29

A Well, but they didn't have "media playback system" in Claim 3. It's not like they substituted. They just added the word "particular" in front of "playback," right?
Am I reading that correctly? 02:07:46
Q Yeah. Well, it says "a media particular playback system," right, currently, as amended?
Do you see that?
How about you read the first four lines of the claim before you get to the "wherein" clause. 02:08:21
A Wait, I'm sorry, am I looking at the same paragraph?
Q Yes, it's --
A This is the bottom of page 3 in the document, that paragraph, right? 02:08:35
Q Right. So let me read -- let me read Claim 3 as amended.
A Okay.
Q It says:
"The method of Claim 1 wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the 02:08:40 02:08:52

control device to a particular zone group of a media particular playback system that includes a first zone and a second zone."

Do you see that? 02:09:01

A Yes.

Q Okay. Before that -- before that claim limitation was written, right, it said "a media playback system," not "a media particular playback system," correct? 02:09:18

A Correct.

Q So if we changed "a media particular playback system" back to "a media playback system," would a person of ordinary skill in the art understand what Claim 3 means? 02:09:35

A The problem is I was assuming your question meant to remove all "particulars." But you're saying just to remove the one?

I think I can agree that "media playback" is more general than "media particular." 02:10:30

Q Right. So you understand this claim -- you understand Claim 3 if it didn't say "media particular playback system" and instead it said "media playback system," correct?

A I would understand it better, yes. 02:11:01

Q Do you think the applicant amended "media playback system" to "media particular playback system" to overcome the cited references?

A I don't know how to answer that. You'd have to ask the applicant. 02:11:25

Q Well, we talked about the Dua reference, right?

A Yes.

Q And the Dua reference disclosed a media player that can play particular media formats, 02:11:33 right?

A Right.

Q And we talked --

A But there are many ways to respond to it. So I don't know if that was the only reason, is what 02:11:51 I'm trying to say. I can't put myself in their shoes.

Q Right. But you understand that Dua discloses a media player that can play different kinds of media formats and different types of media, right? 02:12:08

A Yes.

Q So why do you think the applicant amended "media playback system" to be a particular system -- "a media particular playback system" if Dua already teaches a media player that can play different kinds 02:12:28

of media formats and different types of media?

MR. KAPLAN: Objection. Asked and answered.

THE WITNESS: Yeah, I don't know the strategy they had in amending the claim.

BY MR. PAK: 02:12:48

Q But do you agree with me that amending "media playback system" to "media particular playback system" would not overcome the teachings of Dua?

MR. KAPLAN: Object to form.

THE WITNESS: It depends how they conceive -- 02:13:07 or perceive the word "particular". If they were trying to make this broader than the formats that Dua was listing, then maybe that was their strategy. So in their mind, they're trying to say it's broader. 02:13:26

But, again, I don't -- I don't know why they used the word "particular".

BY MR. PAK:

Q What does it mean to play a particular media format? 02:13:43

A To play a particular media format? It means the system is instructed to start playing that format, that content in that format.

Q So does Dua disclose a system that's instructed to start playing a particular media 02:14:17

format?

A He does. And he lists examples of those formats.

Q What does it mean to play a particular type of media? 02:14:35

A Isn't that the same answer -- or the same question? I'm not sure -- as opposed to the format you mean?

Q Yeah. So, you know, there's -- you can play a particular type of media format, right, and that 02:14:55 would be like an MP3 or 4 and the like, correct? But you can also play a particular type of media, which could be video or audio, text and the like, correct? Do you follow?

A Yes. 02:15:13

MR. KAPLAN: Object to form.

BY MR. PAK:

Q Okay. So in that context, does Dua disclose a system that can play a particular type of media?

A He discloses several types of media, 02:15:40 pictures, images, PowerPoint presentations, audio, video. Yes.

Q So when the applicant amended "media playback system" to "media particular playback system," would you agree with me that amending "media playback 02:16:11

system" to "media particular playback system" would not overcome the teachings of Dua?
MR. KAPLAN: Objection. Asked and answered.
THE WITNESS: I mean, that's a tough call. That's why we have examiners, right? I don't know if I can make that call. 02:16:31
BY MR. PAK:
Q Well, are there any other reasons why the applicant would amend "media playback system" to "media particular playback system"? 02:16:53
A Other than trying to respond to the examiner or -- as I said, you know, that would be one reason. Or they thought they had made an error and they're trying to correct it. Those are the two main reasons in my head. 02:17:10
Q Okay. So take a look at PDF page 15 again, "Summary of the Office Action".
A Yes.
Q In the "Summary of the Office Action," it talks about 103 rejections, correct? 02:17:34
A Yes.
Q Do you see any other rejections?
A I'm sorry, can you remind me what the 103 rejection is?
Q Yeah. So 103 rejection is an obviousness 02:17:48

type rejection.
There's also 102 type rejections, which could be anticipation -- anticipatory type rejections, right?
And then you also have 112 rejections, which might have to do with, you know, formality of the claims or, you know, maybe the patent lacks written description of enablement and the like. Or it might be indefinite, right? 02:18:02
A Right. Okay. 02:18:18
Q All right. So with that understanding here, do you see in the Summary of the Office Action there are only 103 rejections, right?
A Right.
Q And you don't see any 112 rejections, correct? 02:18:28
A Correct.
Q So the -- so the applicant here was responding to the examiner's 103 rejections in the non-final office action of July 25, 2016, correct? 02:18:44
MR. KAPLAN: Object to form.
THE WITNESS: Yes. I presume that's what -- the response that was written by the applicant, right?
BY MR. PAK: 02:18:56

Q Right.
A Paragraph 3?
Q Yeah. And looking at Claim 3, you're not entirely sure why the applicant amended "media playback system" to "media particular playback system," correct? 02:19:12
A I'm not sure, no.
Q But you do understand that Dua discloses a media particular playback system, correct?
A Correct. But I guess the question is, is that the only way to respond to that rejection? Without being the applicant and knowing more, I couldn't answer that. 02:19:29
But it was a response presumably to address the concern. That doesn't make it the correct response. It's a response. 02:19:42
Q Right. And the only other reason why an applicant would amend its claims, other than responding to an examiner, would be to correct an informality, such as a typographical error, correct? 02:19:59
MR. KAPLAN: Object to form. Mischaracterizes. Leading.
Go ahead.
THE WITNESS: Those are two reasons I have off the top of my head. I mean, there could be 02:20:12

other reasons that I'm not -- I don't think those are the only two reasons to list.
BY MR. PAK:
Q Sitting here today, can you think of any other reasons why an applicant would amend its claims other than those two reasons? 02:20:24
A I don't know. The marketing department decided that it would be important to have certain words in the patent?
I'm thinking -- I'm trying to think of other reasons. There could be a lot of other reasons. It depends. They become a public record, obviously, so that could be another reason. 02:20:41
Q Why do you think the applicant would amend "media playback system" to "media particular playback system" if amending "media playback system" to "media particular playback system" would render the claim indefinite, in your opinion? 02:20:59
A Well, I don't think they asked me my opinion, so how would they know that this would become an issue? 02:21:22
At the time, I'm sure it made sense to them for some reason that we don't know, that I don't know.
Q That's fair. 02:21:31

Now, I want to go back to the '206 patent now. It's Exhibit 10. And I want to take a look at column 8.
A Okay.
Q Okay. And you don't have to read this out loud, but could you please review lines 7 through 36. 02:22:11
A 7 through 36?
Q Yeah. And then we can discuss.
And just let us know when you're finished. 02:22:35
A Okay.
Q Okay. Does the '206 patent disclose two mechanisms for grouping zone players?
MR. KAPLAN: Object to the form.
THE WITNESS: I'm trying to see where it says another mechanism. I see what it says, but it starts -- the line starts with "One mechanism for joining zone players." 02:23:34
BY MR. PAK:
Q Sure. And what is that one mechanism? 02:23:46
A It says:
"To link a number of zone players together to form a group."
Q And what does the '206 patent say that one mechanism entails to link a number of zone players 02:24:07

together to form a group?
A So they -- one second.
"The user may manually link each zone player or room one after the other," sequentially presumably. 02:24:24
Q So that's the -- that's the one mechanism disclosed in the '206 patent, right?
A Yeah.
MR. KAPLAN: Object to form.
BY MR. PAK: 02:24:37
Q Is there another mechanism for linking a number of zone players together to form a group?
A I guess you must be referring to line 23 perhaps:
"According to one embodiment, a set of zones can be dynamically linked together using one command." 02:24:57
Is that the other mechanism that you're referring to?
Q Yes. 02:25:16
A Okay.
Q So the '206 patent discloses example zones, correct?
A Right. They have a list of what they call zones and then some names, yeah. 02:25:30

Q What are the example zones disclosed in column 8?
A Bathroom, bedroom, den, dining room, family room and foyer.
Q Okay. And looking at column 8, line 29, could you please read that -- read the first three sentences. 02:25:45
A Okay.
"For instance, a Morning zone scene/configuration command would link the bedroom, den and dining room together in one action. Without this single command, the user would need to manually and individually link each zone. Figure 3A provides an illustration of one zone scene where the left column shows the starting zone grouping. All zones are separate. The column on the right shows the effects of grouping the zones to make a group of three zones named after Morning." 02:26:09 02:26:21 02:26:35
Q Okay. So I want to take a look at Figure 3A now. It's on PDF page 8.
A Yes. 02:27:06

Q So on the left side of the arrow, you know, I see bathroom, bedroom, den, dining room, family room and foyer, right?
A Yes.
Q What do -- what does the left side of the arrow represent, or those rooms represent? 02:27:17
A Based on what we just read, they call them zones.
Q And the right side of the arrow -- well, what does -- what does the right side of the arrow indicate in Figure 3A? 02:27:42
MR. KAPLAN: Object to form.
THE WITNESS: It's the same -- the same zones, but the -- but three of them have been put in a -- some kind of group. And that group is -- has the bracket that indicates that it's called Zone Configuration/Scene. 02:27:54
BY MR. PAK:
Q What are -- what are the three zones that are put into some kind of group? 02:28:22
A Bedroom, den and dining room.
Q Do you know what the name of that -- what the patent describes as -- let me start over.
What does the patent call this group that includes the three zones, bedroom, den and dining 02:28:49

room?
A Sorry, what was that column? Was it column 8?
Q Yes, column 8.
A And it says "to make a group of three zones named after Morning." A little odd that the word "after" is there, but okay.
Q Yeah, go -- look at the sentence before. You know, it says:
"Figure 3A provides an illustration of one zone scene where the left column shows the starting zone grouping. All zones are separate. The column to the right shows the effect of grouping the zones to make a group of three zones named after Morning."
Right?
A Right.
Q So looking at Figure 3A, the group of zones, bedroom, den and dining room, that's an illustration of a zone scene, correct?
MR. KAPLAN: Object to form.
THE WITNESS: So I didn't provide an opinion on what a zone scene is. To define that here kind

Page 182

of on the fly would be a little premature, or I'd have to look at it more.
You know, reading through for the -- for the other opinions that I formed, I found that zone scene represents some kind of grouping, but it has something additional, some kind of theme or attributes that go beyond a simple grouping.
But, again, that's not a -- that's not an official opinion yet.
BY MR. PAK:
Q Okay. So, you know, looking at column 8, you know, where we were before, and it says:
"For instance, a Morning zone scene/configuration command would link the bedroom, den and dining room together in one action."
Do you see that?
A Yes.
Q And then, you know, as we discussed, it says:
"The column to the right shows the effects of grouping the zones to make a group of three zones named after Morning."
Do you see that?
A I see.

Page 183

Q So with respect to Figure 3A, you know, the group of three zones named after Morning, that's referring to the Morning zone scene, correct?
MR. KAPLAN: Object to form. Asked and answered.
THE WITNESS: Well, but it has -- in line 29 it says "Morning zone scene/configuration," and then in Figure 3A it says "zone configuration/scene," the other way around.
So I couldn't tell from this for sure without looking further if that is the definition of zone scene or not. It has additional stuff.
BY MR. PAK:
Q Right. But your understanding of a zone scene is that it's some kind of representation of a grouping that has some additional attributes, right?
A Yes, that's my best understanding. The attributes having to do with what throughout the specification is called some kind of themes.
Q Why don't we take a look at column 10 of the patent.
A Okay.
Q And I want to look at line 21 here. It says:
"Given a saved scene, a user may activate the scene at any time or set

Page 184

up a timer to activate the scene at 610."
Do you see that?
A I see it.
Q After the user activates the scene, what does the '206 patent say happens next?
A So they say "scene" here, which is not clear if they mean zone scene in their own language. That's my first thought.
But what -- you're saying what do they say in this sentence?
Q Yeah, so let's back up here.
And, you know, this is talking about with respect to Figure 6, but at the -- you know, the first paragraph of column 10, says:
"The process 600 is initiated only when a user decides to proceed with a zone scene at 602."
Do you see that?
A Yes.
Q So when it talks about a scene at step 610, it's talking about a zone scene, correct?
MR. KAPLAN: Object to form.
THE WITNESS: Probably, but why don't they just write it to make it clear? It's not -- most

Page 185

likely is my answer.
BY MR. PAK:
Q Okay. So at 610, you know, I read this before. It says:
"Given a saved scene, a user may activate the scene at any time or set up a timer to activate the scene at 610." 02:35:11
So what does the '206 patent say happens next? 02:35:25
A After this action has happened?
Q Yes.
A It's the next couple of sentences, right?
Q So what does that say?
A So line 24: 02:35:44
"At 612, upon the activation of a saved scene, the process 600 checks the status of the players associated with the scene."
Q Okay. So what does -- what does the patent say happens at step 614? 02:35:56
A
"At 614, commands are executed with the parameters, e.g., pertaining to a playlist and volumes." 02:36:11

Q I think -- I think member -- so member here is referring to devices or nodes on the network, right?
A Okay.
Q So you agree with me that after a user activates a zone scene, data is transported from a member, for example, a controller or a player, to other members in the zone scene, right? 02:37:36
A Yes.
Q And what does that data that is transported from a member to another member pertain to? 02:37:57
A Well, in the example they provide, it says it pertains to a playlist and volumes. So we have to read it the way they say it, right?
Q Yeah. So let's take a look at column 10, lines 12 through 20. It starts with "In the example of Figure 1." 02:38:23
Do you see that?
A Yes.
Q Could you please read the first two sentences. 02:38:35
A
"In the example of Figure 1, the scene is saved in one of the zone players and displayed on controller 02:38:43

Q And what is the next --
A Yeah, go ahead?
Q Can you keep reading the next two sentences.
A Yes.
"In one embodiment, data, including the parameters, is transported from a member, e.g., a controller, to other members in the scene so that the players are caused to synchronize an operation configured in the scene. The operation may cause all players to play back a song in identical or different volumes or to play back a pre-stored file." 02:36:23 02:36:34
Q So after a user activates a zone scene, data is transported from a member to another member in the zone scene, right? 02:36:51
MR. KAPLAN: Object to form.
THE WITNESS: So what is a member here?
BY MR. PAK:
Q So a member here -- you know, you just read it here. It says "transferred from a member, for example, a controller."
A member can also be a player, right?
A Okay. 02:37:24

142. In operation, a set of data pertaining to the scene includes a plurality of parameters. In one embodiment, the parameters include, but may not be limited to, identifiers, e.g., IP address, of the associated players and a playlist. The parameter may also include volume/tone settings for the associated players in the scene." 02:38:56 02:39:08
Q Okay. So returning to my question, after a user activated a zone scene, there is some data that is transported from a member to another member in the scene, right?
MR. KAPLAN: Object to form. 02:39:27
THE WITNESS: That's what this paragraph seems to describe, yes.
BY MR. PAK:
Q Right. And that data that's transported from a member to another member is data pertaining to a zone scene, correct? 02:39:36
MR. KAPLAN: Object to form.
THE WITNESS: Well, it's data -- it's a set of parameters that they want to apply to that zone scene they're sending. 02:39:58

BY MR. PAK:
Q Right. So let me ask you this way.
So when a scene is saved in one of the zone players and displayed on a controller, right, there is some form of data pertaining to that zone scene 02:40:12
that gets saved in the zone player, right?
MR. KAPLAN: Object to form.
THE WITNESS: This is not the data that we're talking about here that's being sent to it. I'm not sure I understand. 02:40:37
There's a scene that's been created. And this to me says that from -- the user can decide from the controller to select that scene -- and I'm paraphrasing -- and send these parameters that we talked about to the zone players in that scene. 02:40:53
BY MR. PAK:
Q Okay. So let's look -- let's relook at column 10, lines 12 to 15. It says:
"In the example of Figure 1, the scene is saved in one of the zone 02:41:08
players and displayed on controller 142. In operation, a set of data pertaining to the scene includes a plurality of parameters."
Do you see that? 02:41:18

A Yes.
Q Now, when you save a zone scene in one of the zone players, you're really saving data pertaining to the zone scene in one of the zone players, correct? 02:41:29
MR. KAPLAN: Object to form.
THE WITNESS: I don't know. I don't know what they're saving.
BY MR. PAK:
Q Well, the zone player has to save some form 02:41:44
of data that represents the zone scene, right, if it's going to save a zone scene?
MR. KAPLAN: Object to form.
THE WITNESS: I guess what I'm trying to figure out there is, isn't the zone scene the data 02:42:07
itself?
BY MR. PAK:
Q Well, let me ask -- let me ask you this way.
When you want to save a song on your computer, some form of data is saved on that 02:42:27
computer, right, that represents the song?
A Well, it's the audio file that is the song.
Q Right. So when you -- when you save a song on a computer, you're saving a -- you're saving a file that represents a song and -- let me just 02:42:49

repeat that.
So when you save a song on a computing device, you're saving a file that represents a song in the computing device, correct?
A No, I don't agree with that. 02:43:17
What is a song? That's an abstract -- the song is the file. So it's not a representation. It's the song. That is the file that you're saving.
Q So when someone says -- so when a user decides to save a song, what happens under the hood, 02:43:40
like, how does the computing device save a song?
A The song --
MR. KAPLAN: Object to the form.
THE WITNESS: Assuming the song is in digital form, the computing device saves the song file which 02:44:02
contains a sequence of bits that, when played back, are the song.
BY MR. PAK:
Q Yeah, so let me ask you it this way then.
When a user tries to save a song from a 02:44:27
computer from an Ethernet interface, right, if -- the user inputs a command to save the song, right?
A Yes.
Q And the computing device receives that command to save a song, correct? 02:44:57

A Yes.
Q How does the computing device or, you know -- starting over here.
What action does the computing device do to actually save a song in the computing device? 02:45:14
MR. KAPLAN: Object to form.
THE WITNESS: Assuming the saving location has -- the saving location has been determined, which is the intermediate step, the computing device will start at the first bit and start writing it to 02:45:31
that location until it's finished. In memory or on the hard drive somewhere.
BY MR. PAK:
Q So the computing device saves a song in the hard drive or memory, you know, in the form of a 02:45:57
file, right?
A I don't know -- the song is a file. It sounds like you're saying the song is something else and then it gets converted to a file, and that's just not the case. 02:46:17
The song is the file. Without that, there's no song.
Q Well, let me ask you this way.
From a user perspective, right, a user would say that he or she plays a song, right? He or she 02:46:59

wouldn't say that he or she plays a file, right, or plays data?
A Well, that's the vernacular as opposed to the actual technical. I could point you to a number of users in my department that would say they're playing a data file. 02:47:27
So, I mean, I don't think that's -- I mean, maybe a user would say that, but it doesn't make it technically correct.
Q All right. Let's talk about this in the context of Microsoft Word then. 02:47:49
When you save a Microsoft Word document, right, what format does your computing device save a Microsoft Word document?
A It is again a sequence of bits that -- the format is not open to us. It's a Microsoft internal format. So I couldn't tell you what the file looks like. You can only reopen it by using their user interface. 02:48:13
Q When you save a Microsoft Word document, you're saving some form of data, right? 02:48:39
A I mean, that's -- everything on your computer is data, so yes.
Q And that data that is saved represents the Microsoft Word document, right? 02:49:12

A I think it's the same thing. As I said before, it doesn't represent it, it is the Microsoft Word document. It's not like you have another representation. It's the -- it's the only one, and it is the document. 02:49:30
MR. PAK: Why don't we take a break now. I think we've been going on for a while. I don't have a whole lot left here. I know it's Friday. I don't want to keep you here too long.
THE VIDEOGRAPHER: Off the record at 2:50 p.m. 02:50:06
(Recess.)
THE VIDEOGRAPHER: We are on record at 3:02 p.m.
BY MR. PAK: 03:02:27
Q I want to take a look at paragraph 74 of your declaration.
A Yes.
Q Would you please read the first sentence.
A 03:02:48
"Claims 1 and 12 of the '033 patent recite transmitting an instruction, and Claims 2 and 3 recite wherein the instruction comprises an instruction." 03:02:56

Q Okay. And during the break I uploaded the '033 patent and marked it as Exhibit 14.
(Exhibit 14 was marked for identification electronically and is attached hereto.)
BY MR. PAK: 03:03:09
Q Do you see that?
A Just checking here.
Yes.
Q And you looked at the '033 patent, correct?
A Yes, I did. 03:03:26
Q I want to take a look at Claim 1 on PDF page 28.
Could you please read the transmitting an instruction limitation that you mentioned in paragraph 74 of your declaration. 03:03:50
A I'm still scrolling.
Q It's the second to the last page.
A Yes. You want me to read the part that has the transmitting the instruction?
Q Yeah. How about -- how about you read the transmitting an instruction limitation, you know, all the way -- all the way before the "wherein" clause. 03:04:13
A Okay. So line 53?
Q Yeah, correct.

A
"Based on receiving the user input, transmitting an instruction for at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device." 03:04:35
Q Okay. Let's take a look at Claim 2, column 18. Could you please read Claim 2.
A 03:04:47
"The computing device of Claim 1 wherein the instruction comprises an instruction for the cloud-based computing system associated with the media" -- 03:04:58
Sorry. Let me start over.
"The computing device of Claim 1, wherein the instruction comprises an instruction for the cloud-based computing system associated with the media service to provide the data identifying the next one or more" -- 03:05:10
"the next one or more media items to the given playback device for use in retrieving at least one media item 03:05:22

from the cloud-based computing system associated with the cloud-based media service."

Q That's a pretty long claim, right?

So the instruction recited in Claim 2 is referring to the instruction for at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device recited in Claim 1, correct? 03:05:38

A Yes. 03:06:14

Q In other words, the instruction recited in Claim 2 is not referring to the program instructions stored on the non-transitory computer readable media as recited in Claim 1, correct?

MR. KAPLAN: Object to form. 03:06:43

THE WITNESS: I guess it's not clear what is the difference between the program instructions. Aren't they all instructions? I'm trying to understand the reference here.

BY MR. PAK: 03:07:12

Q Does the instruction recited in Claim 2 refer to an instruction for the at least one given playback device to take responsibility for playback on the remote playback queue from the computing device in Claim 1, or does it refer to the program 03:07:35

instructions recited in Claim 1?

A Well, that's the thing. They're all program instructions, right? So this instruction, whichever -- whatever it's referring to, is a program instruction, right? So I don't see the difference necessarily. 03:07:56

Q Well, Claim 1 recites an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device, right? 03:08:16

A Right. But at the beginning of Claim 2 is program instructions, when executed by at least one processor, cause the computing device to perform functions comprising -- and then a whole bunch of functions -- and then this instruction clause. So it's -- 03:08:35

Q Well, let's look at paragraph 74 again in your declaration.

A Yes.

Q And you say that "Claim 1" -- I'm sorry: 03:08:49

"Claims 1 and 12 of the '033 patent recite transmitting an instruction, and Claims 2 and 13 recite wherein the instruction comprises an instruction." 03:09:04

So in that sentence, you understand that wherein -- the term "wherein the instruction" recited in Claim 2 refers to transmitting an instruction term in Claim 1, right?

A Yes. I agree with that. 03:09:31

Q Okay. So the instruction recited in Claim 2 is not referring to program instructions recited in Claim 1, correct?

MR. KAPLAN: Object to form.

THE WITNESS: I guess that's what I was trying to say before. It's referring to the -- to the instruction that we read in that clause of the claim. But it's still a program instruction. That's all I was trying to say. 03:09:45

MR. PAK: Okay. I have no further questions. I appreciate your time, Dr. K. 03:10:02

Thanks for your time as well, Marc.

MR. KAPLAN: Sure. I'm just thinking for a moment.

We'll reserve signature. And no questions for me. 03:10:18

THE VIDEOGRAPHER: We are off the record at 3:10 p.m. This concludes today's testimony given by Dr. Chris Kyriakakis. Total media used was five and will be retained by Veritext Legal Solutions. 03:10:38

I, CHRISTOS KYRIAKAKIS, do hereby declare under penalty of perjury that I have read the foregoing transcript; that I have made any corrections as appear noted, in ink, initialed by me, or attached hereto; that my testimony as contained herein, as corrected, is true and correct.

EXECUTED this _____ day of _____, 20____, at _____, _____.
(City) (State)

_____
CHRISTOS KYRIAKAKIS

I, the undersigned, a Certified Shorthand Reporter of the State of California, do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that any witnesses in the foregoing proceedings, prior to testifying, were placed under oath; that a record of the proceedings was made by me using machine shorthand which was thereafter transcribed under my direction; further, that the foregoing is an accurate transcription thereof.

I further certify that I am neither financially interested in the action nor a relative or employee of any attorney of any of the parties.

IN WITNESS WHEREOF, I have this date subscribed my name.

Dated: June 14, 2021

KATHLEEN E. BARNEY
CSR No. 5698

Page 202

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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